Ronin Camera & Ronin Camera Link App

User Manual

Ronin Camera Firmware : **V1.29a**
Released : **10/30/2023**

Ronin Camera Link App : **V2.0.9**
Released : **10/30/2023**

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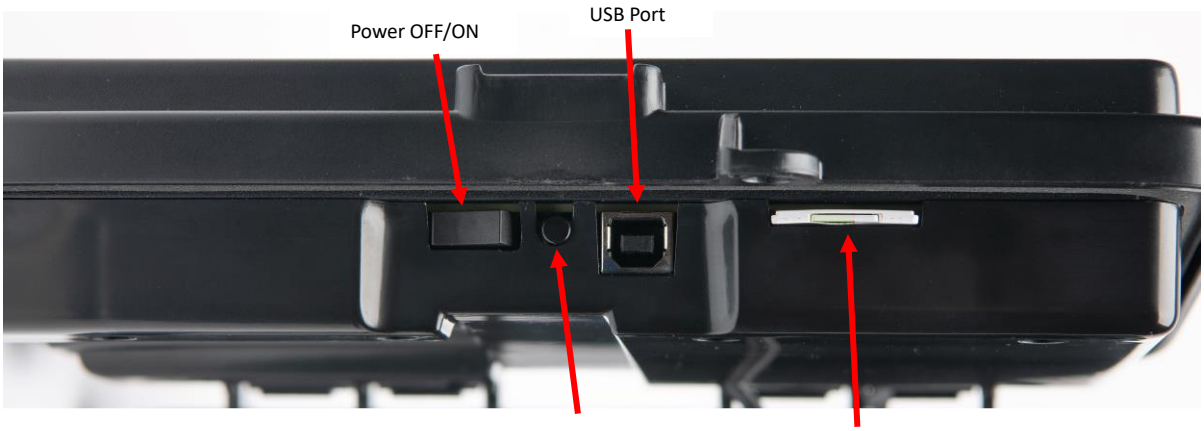
I. Introduction & Setup

The **Ronin Camera** is battery powered dual camera product with both a 1080p high definition 5MP Video Camera and a FLIR Thermal Imaging Camera all in one. It contains either a complete sub giga-hertz (GHZ) 915Mhz Radio Transceiver for long distance communication to a **Ronin Sentinel** base station, or an internal cellular modem connection. The Ronin Camera can work as an advanced trail camera or operate as a superior property security camera where cellular based cameras will not work or are undesired. It is also ideal for those seeking a secure camera system that can send free (*) email and/or text alerts with an attached image or video when motion is detected.

> **By "free" we mean without charge from Diamond Edge. You must have an existing internet connection and a phone or other device capable of receiving text messages at no additional charge. Although not common today, some internet and cellular providers or cell plans may still charge for each text message and this is beyond our control.*

I.a. Camera Hardware

Side view (when case is open):



Battery Type Switch:
← Lithium-Ion LiFePO4 →

Battery view:

(3) Batteries :
Supports 18650, 26650, or 26700 sized batteries. Camera comes with 3.2V **LiFEPO4** type batteries which are good for all uses (especially when using with a solar panel) and are the recommended type to use.

Camera also supports **Lithium-Ion** batteries if the "Battery Type" switch is set and *you do not want to recharge the batteries inside the camera case* (either by solar or wall power). Lithium-Ion will not recharge from solar and must be recharged outside of camera case.

Rear View:

I.b. Main Camera Features

The Ronin Camera is a high-performance dual camera product that integrates both a 5MP high-resolution 1080p video camera and a FLIR Thermal Imaging camera for recording images or video. The complete device comes in a camouflaged outdoor case for remote motion detection and image capture of animals, people, bicycles, and vehicles. The batteries, SD card, and all other elements necessary for extended outdoor use are all included in the compact case.

The Ronin Camera contains either a powerful 1 Watt 915Mhz radio transceiver or a cell modem that allow for remote live viewing and sending "alerts" when motion is detected. The radio can send images and videos up to 9 miles away (*) to a Ronin Sentinel base station which forwards the alert by text or email to the user. The cell modem version requires a monthly fee cellular plan. *(* radio distance depends on antenna and terrain, see below)*

For permanent installations, a solar panel or wall power connected to camera can make it last indefinitely. In battery only modes, batteries typically last 4-6 months or up to 35,000 images.

The camera also contains a built in GPS receiver to record the location, a powerful infrared light not visible to humans to illuminate night time captures, an 802.11 WiFi link for permanent connection or for camera setup, passive infrared motion detector, three long lasting LiFEPO4 batteries that can be easily changed in the field, and a locking front latch with optional padlock for extra security. There is no finer camera on the market than the Ronin!

Ronin Camera Specification:

General:

- Ultra-low power motion detection Passive IR sensor 80' to 100' away or FLIR Camera up to 200' distance. Adjustable sensitivity, debounce, and FLIR zone of detection.
- High speed SD Card slot supports up to 2TB cards. Swap cards at any time without restarting.
- Fast trigger time of 0.1 sec in Large Solar/Wall power modes, 0.5 sec in Small Solar/Batt+FLIR mode, or ~3 seconds in Batt Only mode.
- Built in solar charger with MPPT (Maximum Power Point Tracking)
- 802.11 WiFi, USB, and Radio/Cell Modem link supported.
- Integrated GPS receiver with camera security tracking options
- Ronin Camera Link app for iOS, Mac, Android, and Windows
- Wide temperature range operation -20C to +85C.
- Locking front panel and secure case strap points.
- 6 Month warranty.
- Designed and built in the U.S.A.!

Radio Specifications:

- 915Mhz radio with 3 speed modes
- Sends alerts for:
  + Motion with image or video
  + Low Battery
  + Lost Link
- Supports wide range of antennas to allow for greater distance.
- U.S.A, Canada, South America, and Australia certified modules.
- Camera range up to 9 miles in most conditions. Longer ranges possible depending on line of sight, obstacles, and antenna type. Contact us for more details.
- Daisy chain cameras together for even greater range!

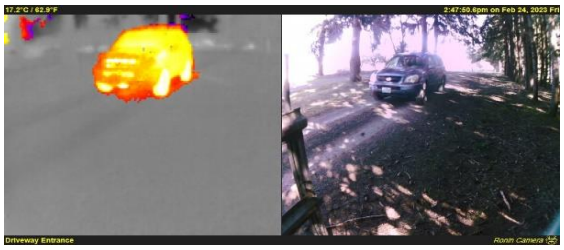
Video Camera:

- 5MP Camera
- Record Images and/or Videos
- Up to 1080p video with adjustable frame rate and video length
- Auto detection of Day/Night modes with automatic IR Cut filter.
- Invisible 940nm infrared light panel to illuminate objects up to 50' away from the camera at night without giving camera position away.
- 110 degree field of view.
- 1.4um x 1.4um pixels with OmniBSI technology
- Automatic Exposure, White Balance, Band Filter, Black Level Calibration, and 50/60 Hz Luminance Detector
- Auto sync to FLIR camera

Camera Link App:

FLIR Thermal Camera:

- 160x120 Resolution
- Long Wave Infrared (LWIR) sees at night and through fog, snow, rain
- Thermal Sensitivity < 50mK
- Proprietary "Color Tracker" technology to highlight motion
- Multiple view types including Color Tracker, Fusion, Grayscale, etc.



I.c. Camera Power & Batteries

There are four primary ways to power the Ronin Camera:

- **Battery Power:** Opening the front panel exposes a three battery holder at the base of the camera. Similar to many battery chargers, the Ronin uses a flexible sliding mechanism so that different sizes of batteries can be used. All Ronin Cameras come with three 26700 sized 3.2V LiFEPO4 batteries that work well in all applications.

  Users can also use 26650 or 18650 size batteries. These have less capacity, but can be an inexpensive and easily obtainable option. DO NOT use different size batteries in camera (they must all be the same size and type).

  Selecting the type of battery type is very important. The built in battery charger is designed to work only with 3.2V LiFEPO4 batteries and *you cannot use any other battery type if you want to recharge the batteries using a solar panel or with the included wall charger*.

  However, 3.7V Lithium-Ion batteries offer more capacity and higher density than LiFEPO4 batteries and they can also be used with the Ronin Camera if you slide the switch at the top of the battery pack to the "Lithium-Ion" side. The downside of Lithium-Ion batteries is that they do not work well in solar panel recharging applications because they require a steady temperature to recharge correctly (and outdoor products do not have that). If you are using the Ronin Camera in "Battery Only" mode and can recharge your Lithium-Ion batteries with an external charger, then it is okay to use them with the camera IF YOU SLIDE THE SWITCH to the Lithium-Ion side. Be sure to slide the switch back to the LiFEPO4 side if you go back to this type of battery in the future.

- **Wall Adapter:** Included with your Ronin Camera is a standard wall adapter that ends in a plug that can be connected to the camera. You can use this to run your camera entirely, although it is a better idea to add in the three LiFEPO4 batteries so you have a backup source if the main power goes down. The Wall Adapter can also be used to recharge the LiFEPO4 batteries in the camera at any time.

- **Solar Panel:** The camera is specifically designed for use with solar panels and contains an advanced MPPT (Maximum Power Point Tracking) charger to maximize power out of the panel. Refer to section II.c.6 for more information on power modes, but in general solar panels from 5W to 50W can be used to keep your camera running indefinitely. When combined with the LiFEPO4 batteries, the camera can be expected to last many years running from the solar panel with no other power needed.

- **USB Power:** The camera will also run with USB power only if that is the only available source. However, USB cannot provide enough energy to run the infrared night light, so this feature is disabled if running from USB power only. If the night light feature is not needed, then USB power is an acceptable source for the camera.

For most users they will simply pop in the included batteries and recharge them from either a solar panel or the wall adapter and not give it another thought. Diamond Edge also sells extra batteries if users want to have spares to swap out in the field. If you are an advanced user and have special considerations the Ronin Camera can support these alternative methods to maximize the cameras usability for your application.

I.d. SD Card

On the side of the camera is a slot for a standard SD card and the camera comes with a 16GB SD card pre-installed. The Ronin supports almost any card of any size, although if you are collecting video it is recommended to use a "UHS" class card of at least "U1" speed to make it is fast enough to keep up with the video storage.

Formatting of new cards should be done using the "ExFAT" format. The SD card is directly readable by most common operating systems and section V.a. of this document details out the organization of image and video files on the card. Contact Diamond Edge Technology for more information.

I.e. Front Panel Green & Red LED

On the front panel there is a Red and a Green LED that indicate the current camera status. These LED's turn on when the camera is first powered on, and depending on the power mode the camera is in they shut off to make the camera less noticeable. You can get them to come back on anytime by pressing the "Wakeup!" button (see next section).

The LED's indicate the following:

Green LED (Status)

- Starts by blinking slowly once per second when camera first powers on.
- If the camera WiFi is set to SERVER mode (where you can link to it from other devices), the light will go solid green when the server is running and the camera is ready for a link.

  If the camera WiFi is set to CLIENT mode (where the camera links to an existing WiFi network), then the light goes solid green when the link is made to the network.
- Any time motion is detected by the camera the green LED will rapidly blink for a second or two. This shows you that motion was detected.
- If you hold the Wakeup! button down for about 5 seconds the camera will automatically switch to SERVER mode (if it is not already) and power up the WiFi. When it goes solid green the WiFi is ready to be connected to.

Red LED (Battery)

- If there is a power failure of any kind, the Red LED will blink rapidly.
- When nothing is connected to the power input, the Red LED will stay off.
- If you connect a solar panel or the wall power adapter, the Red LED will slowly start blinking to indicate the batteries are charging.
- When the batteries become fully charged, the Red LED will turn solid and the charging source can be removed if desired.
- If the batteries become discharged again, the battery charger will come back on automatically and recharge the batteries. The Red LED will start blinking again until batteries are fully charged.

The Red & Green LED will automatically shut off after a certain amount of time depending on the power mode of the camera. This is usually from 5 to 30 minutes after turning on. You can also change the function of the LED's in the Advanced Camera Configuration screens (see section III.d).

I.f. Wakeup! Push Button

Depending on the power mode the camera is in, after 5 to 30 minutes of running the following will happen:

- The front panel Green and Red LED's will turn off.
- If not connected by WiFi, the WiFi system will also shut off to save power.

At this time the camera is fully functional and is capturing images or video in the mode you programmed it to be. The LED's turn off so that the camera is not as noticeable, and the WiFi is shut off to save power.

To turn the LED's back on and to get the WiFi powered back up (so you can link to the camera and view its operation, download files, or change its settings), press the Wakeup! button.

When the Green LED goes solid the WiFi is ready for a connection. If this does not happen and the Green LED just blinks slowly, hold down the Wakeup! button for 5 seconds until the green LED rapidly blinks. The camera will force the WiFi back on, set it to SERVER mode, and allow you to link to the camera using its wireless connection.

I.g. Setup by - Ronin Camera Link App

If you have a **Ronin Sentinel** be sure to connect your Ronin Camera Link app to the Sentinel before setting up a camera (see section II.a). This gives you the ability to do the following:

1) Take the camera to its final location and install it.
2) Power the camera on and wait for the green LED to go solid.
3) Connect to it with the Ronin Camera Link app using the WiFi on your phone or other device.
4) At the end of the camera setup, you will be asked if you want to connect the camera by radio back to the Ronin Sentinel. If you select this option, the camera radio will be used to add the camera to the Sentinel even if you are a long way away from it.

If you do not have a **Ronin Sentinel**, you can still use the Ronin Camera Link app to setup, live view, and download images and videos from the camera. Follow the steps listed below to connect to the camera.

I.g.1. Ronin Camera Link App- Configuring by USB (Sentinel and Windows Only)

On Windows computers the Ronin Camera can be directly plugged into a USB port and then connected to by the Ronin Camera Link app. BEFORE plugging in your camera, be sure to install the device driver:

1) Install the Ronin Camera Link app on your Windows computer.
2) Locate the program "Ronin USB Driver Installer.exe" in the directory:
   `C:\Program Files\DiamondEdge\Ronin Camera Link\Ronin Camera USB Driver`
3) Double click this program to run it and make sure to allow it to install.

Once the device driver installs Windows can recognize the Ronin Camera and the Ronin Camera Link app will connect to it. Plug the camera into your computer and then follow the steps listed in section III.b. as follows:

1) Click on Manually Link to Ronin Camera or Add Ronin Camera to Sentinel.
2) Click on Setup Camera on USB Port… to connect to the camera.
3) Follow the step-by-step guide to configure the camera.
4) At the end if you have a Sentinel and want to connect the camera to it, click connect By Ronin Sentinel Radio or by WiFi Connection to tie the camera to your Sentinel.
   If you don't have a Sentinel then you will normally choose Use SD Card Only to get your images and videos manually by removing the SD card.

I.g.2. Ronin Camera Link App - Configuring by WiFi

Setting up a camera using WiFi is different depending on your platform. However, the first step for all platforms is to make sure the camera WiFi is in SERVER mode (other devices connect to it) and that the WiFi is ON. You can determine this by looking at the green LED on the front panel:

+ If the green LED is solid on, then the WiFi is ON and ready.

+ If the green LED is blinking or off, then the WiFi is not on and you should hold down the Wakeup! pushbutton for 5 seconds to force the WiFi to turn on and go into SERVER Mode.

NOTE: If you have previously connected this camera to an existing WiFi network as a client then the green LED might be on indicating it is linked to that network as a CLIENT. Hold down the Wakeup! pushbutton for 5 seconds to get out of this mode and go into SERVER mode.

WINDOWS: This is the easiest platform to use WiFi with:

a. Click on Manually Link to Ronin Camera or Add Ronin Camera to Sentinel.
b. Click on Setup Camera by WiFi… to connect to the camera.
c. The app will automatically search for the Ronin Camera serial number and then link to it. No action on your part is necessary.
d. Follow the step-by-step guide to configure the camera.
e. At the end if you have a Sentinel and want to connect camera to it, tap By Ronin Sentinel Radio to tie the camera to your Sentinel.
   If you do not have a Sentinel then you will normally choose Use SD Card Only to get your images and videos manually by removing the SD card.

iOS, ANDROID, & MAC: These platforms do not allow apps to access the list of available networks. That means that the app cannot find the camera automatically. Instead, follow these steps:

a. Open your WiFi network link setup feature on your device. This is where you select a wireless network to link to and enter a password.
b. Look at the list of available networks to find the Ronin Camera. All cameras will be listed by their serial number which starts with "RCS" and then a series of numbers and letters. Select the camera as the network you want to link to.
c. The default password for the Ronin Camera WiFi link is: `rcspassword`
d. Wait for the link to complete. If you get any messages like "Internet is not Available" be sure to ignore these and keep connected to the camera. Some devices like to drop the camera because it does not have an internet link. Be sure to not allow this and stay connected to the camera.
e. In the app tap on Manually Link to Ronin Camera or Add Ronin Camera to Sentinel.
f. Tap Setup Camera by WiFi… to connect to the camera.
g. The app will automatically try to link to the camera you connected to.
h. Follow the step-by-step guide to configure the camera.
i. At the end if you have a Sentinel and want to connect camera to it, tap By Ronin Sentinel Radio to tie the camera to your Sentinel.
   If you do not have a Sentinel then you will normally choose Use SD Card Only to get your images and videos manually by removing the SD card.

I.g.3. Add Camera to Sentinel using Ronin Camera Link App and Radio

As described above, when you have linked your Ronin Camera Link App to a Ronin Sentinel, then the final step in setting up a camera will be to ask if you want to connect the camera back to the Ronin Sentinel. This is done by programming the camera with the information it needs to communicate by radio back to your specific Ronin Sentinel.

If the link back to the Ronin Sentinel succeeds, then it will be added to the Sentinel Main Link screen and will appear in your Ronin Camera Link app the next time you are on the same network as your Sentinel. This is the best way to use the cameras.

I.h. Setup by - Ronin Sentinel

You can also completely setup the Ronin Camera using the Ronin Sentinel itself. Plug in the camera to the Sentinel using a USB cable or use the WiFi link to connect the camera to the Sentinel in the same way that it works with the app. Because the Sentinel uses a Windows base operating system it can automatically find the camera and link to it without any intervention by the user.

Refer to the Ronin Sentinel user manual for complete information on this process. Many users like to use the Ronin Sentinel to pre-configure their cameras before taking them into the field. This is completely acceptable, as is using the app to configure the cameras either before installing them or after installing them and then linking them back to the Sentinel using the radio system.

I.i. Installing the Camera at Location

The Ronin Camera is designed to be easy to install and use. There are four types of installations:

TEMPORARY:

This is the most common way to use the camera for hunting or wildlife observation. The included cinch strap (or an alternate locking strap for greater security) can be used to mount the camera to a tree or pole and then it is setup with a phone and the Ronin Camera Link app.

Motion detection can be verified by watching the green LED on the front panel which will rapidly blink when motion is detected. This helps users identify exactly where the camera is looking for capturing images and videos.

Power is supplied by the 3 internal batteries and the camera is set to “Battery Only” or “Batt+FLIR” power mode for months to weeks of observation. Optionally, users can travel to the location and swap out the batteries periodically with a freshly charged set whenever necessary (swapping out the SD card at this time is also useful). More advanced temporary installations might also include a small solar panel mounted in a place to catch the sun, and then connected back to the camera.

If the user has a Ronin Sentinel, the camera can be set to wake at the top of each hour and see if a Ronin Sentinel is in range. If one is found, the Sentinel can be programmed to automatically download any collected images or videos from the camera at that time. Users will get updates at the top of the hour when a Sentinel is brought into radio range, or get hourly updates from a Sentinel if it is always in range of any data gathered by the camera.

PERMANENT – SOLAR RECHARGED:

This is one of the most common uses of the Ronin Camera and is very popular with large property owners for monitoring distant locations on their land. The camera will run indefinitely from a small solar panel and can communicate by radio over long distances back to a Ronin Sentinel base station when motion is detected.

The camera can be mounted using the included cinch strap or with a locking strap for greater security and durability. The rear camera mount can also be used for the most secure mounting. Setup is done either in advance with a Ronin Sentinel, or with a phone and the Ronin Camera Link app that can then connect the camera back to a Ronin Sentinel using the radio.

Motion detection can be verified by watching the green LED on the front panel which will rapidly blink when motion is detected. This helps identify exactly where the camera is looking for capturing images and videos.

Power is supplied by the 3 internal batteries and a 20W to 50W solar panel. 20W is ideal for the power mode "Small Solar", but it does mean the camera has about a 0.5 second trigger delay which is good for animals. For a faster response of 0.1 seconds (which is important if moving vehicles are going to be activating the camera), we recommend a 30W to 40W panel and setting the camera to "Large Solar" power mode. A 50W panel is not necessary unless you are also using the WiFi as a permanent link to an existing wireless network at the location.

Any motion is captured and an alert is sent back to the Ronin Sentinel which then sends it out to all configured devices as email and/or text messages. The Sentinel will also send alerts if it loses its link to the camera (possibly because it is being tampered with) or if the camera experiences a low battery condition.

At any time users can get a live view from the camera using either a Ronin Sentinel directly or the Ronin Camera Link app communicating through the Sentinel to the camera. All camera configuration and settings can also be changed this way. The current status of the connected cameras is immediately displayed on the app along with the location temperature and the last image captured.

PERMANENT – WALL POWER:

This installation type is very similar to PERMANENT – SOLAR PANEL. However, when a wall power source is available then the internal batteries are only used as a backup power source if the wall power should fail. When wall power is connected all features of the camera are kept on and available.

IMPORTANT: Do not try to run the camera just from wall power - always install the batteries. This is because the infrared night light will cause issues if the camera does not have the batteries as a buffer against the large surge current from the night light. Install the batteries and the camera will keep them topped off for use in the event the wall power should stop.

USB POWER:

The final installation type is to leave out the batteries entirely and just plug in a USB cable. The camera can run from USB power only; however, the infrared night light is automatically disabled in this mode. This is because the infrared night light requires about 14 Watts of power and USB 2.0 is limited to 2.5 Watts.

Other than the infrared night light the camera is fully functional from USB power. It should be noted that the USB plug is under the front panel so connecting to it does expose the camera to the elements. The Ronin Camera is not designed to be run permanently from USB, but as a temporary measure it can be used to quickly communicate to a camera and check its operation.

I.i.1. Installation Best Practices

Like all products installing the Ronin Camera correctly will give the best results. The following guidelines should be followed whenever possible to improve the images and life of the camera:

- Pointing the camera towards scenes with uniform brightness will improve the image quality. If you have bright areas combined with dim areas the camera will not do as good of a job at adjusting the image brightness and the image quality will be less.
- Try to avoid pointing the camera at tree limbs or tall grass that can wave in the wind. The Ronin is very good at avoiding false trips, but a lot of motion of tree limbs or other vegetation moving can fool it into tripping when it is just the wind causing motion. You can turn the sensitivity down to help avoid this, but lower sensitivity delays the activation and results in a longer trigger time which can then miss animals.

- Avoid placing the camera where the sun can shine directly into it at any point during the day. The sun is extremely bright and will overwhelm the regular camera image if it shines directly into the lens. It is best to point the camera North or South and avoid pointing it directly East or West to keep the sun out of the lens.
- On the other hand, place any solar panels where the sun can shine directly on them for as much of the day as possible. Solar panels can provide power even in the deepest forest shade, but you will get much better results if the sun can shine directly on them for as much of the day as possible.
- Use a portable step to mount the camera high up if possible. This helps to prevent camera theft by making it both less noticeable and harder to reach.
- Purchase 1" or narrower locking cinch straps to decrease the chance of theft. These are available from Diamond Edge or from many stores and make it much more difficult to steal the camera. Also be sure to lock the front panel latch before leaving the camera.
- Make sure the camera is SECURELY mounted and not prone to motion. The "Color Tracker" technology we implemented with the FLIR Image works best by determining the background scene temperature and comparing that to the current scene. The camera moving will fool it into thinking the scene is changing when it is not and result in lower quality images.

I.i.2. Installing a Solar Panel

Many installations of the Ronin Camera will use solar panels. The key to solar panel installation is:

1) Make sure to mount the panel where the sun can directly strike it for the maximum amount of time each day. It is okay to use a long cable to connect the panel to the camera if that increases the length of time the panel is exposed to the direct sunlight.
2) It is best to install the panel at a 45 to 60 degree angle. Not only does this increase the direct sunlight, but it also makes a surface that snow and rain will slide off more easily.
3) ALWAYS use a good quality solar panel mounting kit and follow all the instructions for safely mounting the panel. Diamond Edge Technology offers solar panel mounting kits for both 20W-30W panels and 50W panels with complete instructions for mounting the panel.
4) The "RCS-SOLAR-EXT-CABLE-30" part from Diamond Edge Technology is a 30 foot long cable that terminates in a waterproof IP68 rated plug that can be inserted into the camera. We highly recommend this part for connecting solar panels to the Ronin Camera.

The Ronin Camera has many special features and design elements to improve its operating with solar panels. This is one of the best ways of powering your camera!

I.i.3. Installing the Antenna

If you are using the radio to connect the Ronin Camera to a Ronin Sentinel, it is a good idea to first install and configure the antenna you are going to use with the camera to communicate back to the Ronin Sentinel before setting up the camera. The Ronin Camera supports many different antennas and antenna selection is critical for reliable communication

The biggest factors affecting the quality of radio communications is the speed of communication, the antenna size and placement, and the terrain. Having direct line of sight between two antennas is the ideal situation, but this is rarely achievable in real life. Going through buildings and trees will reduce range, and a mountain or hill can completely block the radio signal.

Good antenna type selection and antenna placement can help compensate for terrain and distance issues. The standard antenna that comes with the Ronin is a 5dBi 915Mhz antenna that looks like this:

This can be screwed into the SMA connector at the top left of the camera for immediate use with a Sentinel.

However, this small standard antenna is usually not adequate for ranges greater than about ¼ to 1 mile (depending on terrain and other conditions).

If it is necessary to use a different antenna for your location, the key parameters are the antenna frequency and the "dBi" value. Always use an antenna that is specifically designed for the 900 to 915Mhz range. The larger the "dBi" value the greater the amplification of the signal. However, higher dBi values are more expensive, bigger, and can require more complicated mounting. In addition, not all antennas are suitable for this product so care must be taken in selection.

An "omni-directional" antenna like the image below is one that can transmit and receive from any direction and works extremely well with the Ronin, especially when mounted high up on a roof or tree. Mounting an antenna like this high up on a structure or a tree and connecting it to the camera with a low-loss antenna cable is a good option for improving the range and quality of your radio communication:

The most powerful antennas are usually those that are labeled as "Yagi" antennas. A Yagi antenna has a specific direction and it works best when you point it towards the Sentinel. However, this is only a good choice for the camera if you are not going to ever use the “Daisy Chaining” feature. A Yagi antenna like the one below is an excellent choice for the Ronin Camera since it only must point at the Sentinel to be effective:

I.i.3.1. Daisy Chaining Cameras

At extreme long ranges the Ronin Camera and Ronin Sentinel can daisy chain together to extend the range even further. As long as the closest camera can reach the Sentinel base station, and the other cameras can reach each other, then the range can be extended further than 9 miles. However, daisy chaining does slow the system down since each transmission must be repeated along the chain.

I.i.3.2. Antenna Summary

For distances less than 1/4 mile or 1500 feet, the system usually works very easily right out of the box. Even from inside a building or house you can typically connect to a Ronin Sentinel with the highest speed possible and never give it another thought.

For distances greater than 1/4 mile, or when terrain is an issue, additional effort may be required. Placing an omni-directional antenna on the roof for the Sentinel base station is a great first step and, if necessary, slowing down the speed to Medium or Low speed will greatly extend the range (see section **II.g.1. Radio Connection** for speed information). This is all that is necessary for most customers.

For very challenging configurations with long distances and difficult terrains, customers can add higher dBi antennas to both the cameras and the Sentinel. An omni-directional antenna on the roof for the Sentinel is a good choice along with Yagi antennas for each camera mounted as high as possible and pointed towards the Sentinel base station.

Height of the antennas is an extremely most important factor in improving range!

If this is still not enough, turning on daisy chaining between the cameras can exponentially increase the maximum distance to as much as 50 miles!

II. Ronin Camera Link App – Connect to Ronin Sentinel & Ronin Camera

The **Ronin Camera Link App** (or "app") is a free iOS, Android, Windows, or Mac application that allows you to maximize the functionality of your Ronin Camera. Use the app to setup, live view, and program new cameras and, if a Ronin Sentinel is part of your system, the app can also (a) link Ronin Cameras to the Ronin Sentinel, and (b) check camera status, view last image captured, live view from any camera, download images and videos, and change the settings in any camera connected to the Ronin Sentinel. Multiple users can use the app at the same time to link to monitor their entire camera configuration and status.

This makes the app a superb home and property security tool for viewing different locations around your property. You can connect to cameras many miles away by radio through the app link to the Ronin Sentinel. App features include:

- Link by WiFi to Setup, Live View, and download captured images from a Ronin Camera.
- Add the connected camera to the Ronin Sentinel through its Radio link. This allows you to use the app to setup cameras in the field and then link them back to the Ronin Sentinel using the built in camera radio link.
- Connect to the Ronin Sentinel to display linked cameras and their last image captured, live view the camera video stream, and change the Camera Configuration of any camera connected to the Sentinel.
- View any picture downloaded by the Sentinel directly on your device, or download images from cameras directly to your device.
- Copy and save Images or Videos in different orientations and attach them to text messages or emails.

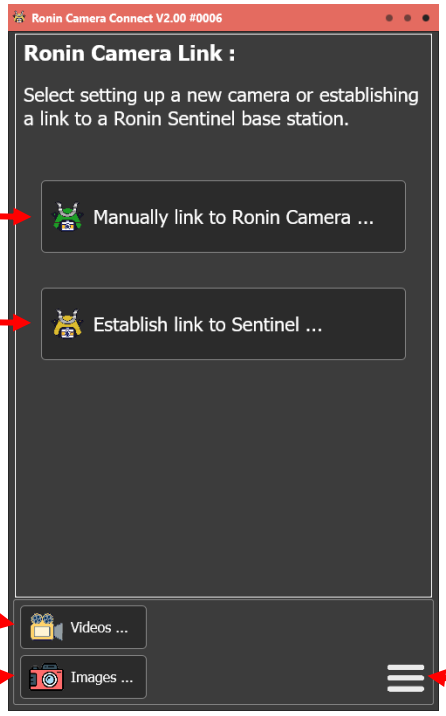
The Windows and Mac version of the app also allow you to:

- Export any saved Image or Video to a variety of formats.
- Export any saved FLIR Image or Video to an Excel spreadsheet that shows a heat map of the pixel-by-pixel temperature of every point in the scene.

The Windows version of the app also allows you to:

- Link using USB to Setup, Live View, and download captured images from a camera.
- Update the camera firmware.

When the app first runs you will see a screen like this:



Tap to connect to a Ronin Camera to Setup, Live View, or Download

Tap to establish a link to a Ronin Sentinel (you must be on the same network as the Sentinel to link to it)

If you have a Ronin Sentinel, you should do this before anything else!

Tap to display images. When connected to a Sentinel this will include images stored on the Sentinel from all cameras

Same as the above except for Videos

App menu options (settings, Help, About, Check for Updates)

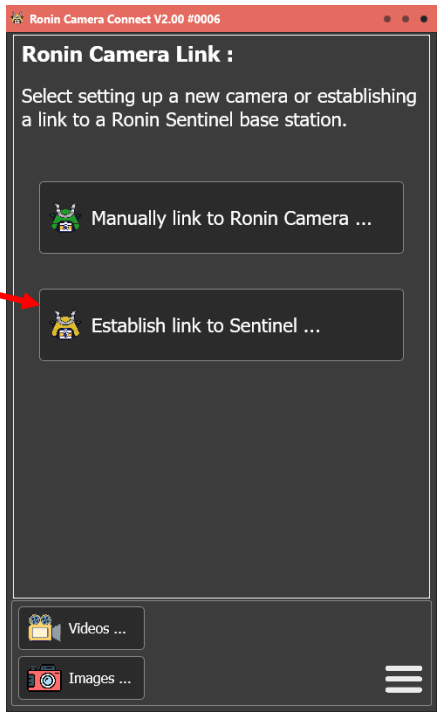
NOTE: If you do not have a Sentinel and have no plans on using one, the app is still very useful. You can tap on Images or Videos to view saved pictures from the cameras saved on your device. Tap Manually Link to connect to a camera, live view its image stream, set camera configuration, and download images and videos.

The main advantage of having a Sentinel is that it stays connected by radio or WiFi to your cameras and can send you text or email alerts when motion is detected from them. The Sentinel also allows you to live view cameras, change camera configuration, and manages all the images and videos from the cameras at any time.

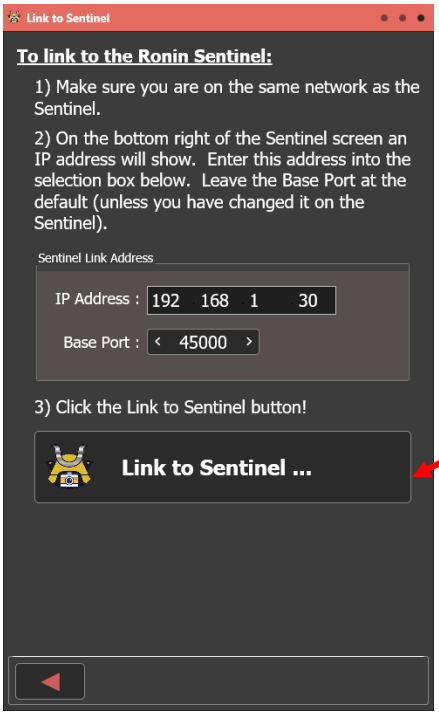
However, a Ronin Camera can function without a Sentinel. In this situation it acts like most other trail cameras where you must be physically close to connect to it. Getting the images and videos captured by the cameras is usually done by removing the SD card and importing the saved images and videos (see III.b.)

II.a. Link to Sentinel

If you plan to use a Ronin Sentinel with your camera or cameras, please pause now to go through the initial setup of the Sentinel before proceeding. The Ronin Camera Link App is designed to work with the Ronin Sentinel (for those installations that use a Sentinel) and many of the features and functions described below work differently if a Ronin Sentinel is part of the setup.



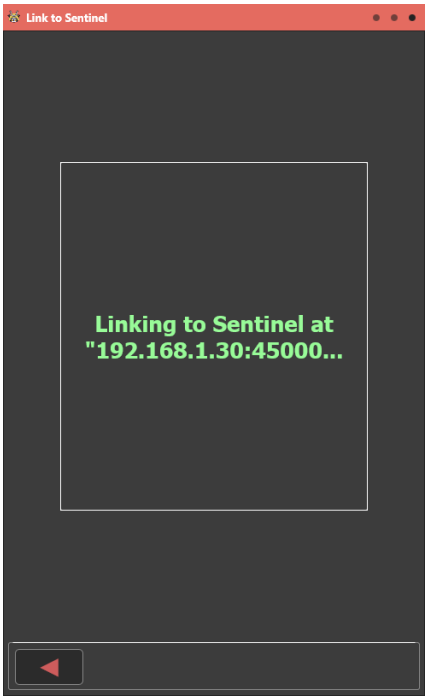
Once the Sentinel is up and running, tap the Establish link to Sentinel ... button on the app to connect your iPhone, Android phone, Windows PC, or Mac to the Sentinel. A second screen like this will appear:



Check the bottom right of the Ronin Sentinel screen for the exact "IP Address" to use. This will vary from installation-to-installation and depends on the IP address assigned by your local router.

Change the app settings to match the Sentinel and tap Link to Sentinel ... to continue.

While establishing the link, the app shows:



When the link completes the screen changes to:

From here you can:

1) Setup and add a Ronin Camera to the app and the Sentinel.
2) Manually link to a camera without adding it to the Sentinel.
3) View Images or Videos that are saved on the local device or on the Sentinel.
4) Live View or change the Camera Configuration of any camera linked to the Sentinel and the app.
5) See the last image or video captured and check the status of any connected camera.

II.b. Manually Link to Ronin Camera

Manually linking to a Ronin Camera and Add Ronin Camera to Sentinel work almost identically. If you do not have a Sentinel then only the first option is available, but in either situation the process the app goes through is the same until you get to the very last step. When selecting Add Ronin Camera to Sentinel the app will ask you in the final step HOW do you want to connect the camera to the Ronin Sentinel: **Radio**, **WiFi**, or **USB**. These options are described in detail in section II.c.7 below.

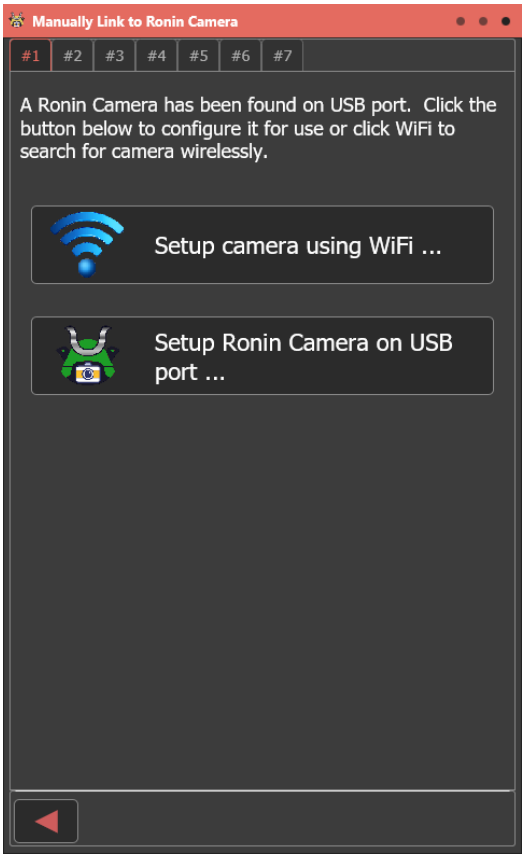
If you are just manually linking to a camera for placement in the field without a Ronin Sentinel link, then the only option in last step is to Use SD Card Only. In this mode the camera does not have an active link where it is reporting motion alerts to a Sentinel. Instead, it will record the image or video in the mode you selected to its SD Card. To get these pictures later you must physically remove the SD Card and import the data into the app, or you can physically go out to the camera and manually link to it to download the images or videos. The Use SD Card Only mode is the lowest power option and is often used in combination with **Battery Only** mode (see power modes in section II.c.5).

Refer to the next section **II.c. Add Ronin Camera to Sentinel** below for a guide on the steps shown when you tap Manually link to a Ronin Camera. Only the last step will be different.

II.c. Add Ronin Camera to Sentinel

The first screen that will appear will ask you how you want to connect to the camera. For iOS, Mac, and Android WiFi is the only option.

For Windows computers, you can also connect to a camera using the USB port. Plug your Ronin Camera into the USB port of the computer and you will get a new link option like this:



II.c.1. Add Camera using WiFi

Connecting by WiFi is different depending on the platform you are on:

Windows:

The app will search for any camera in range and then automatically link to it.

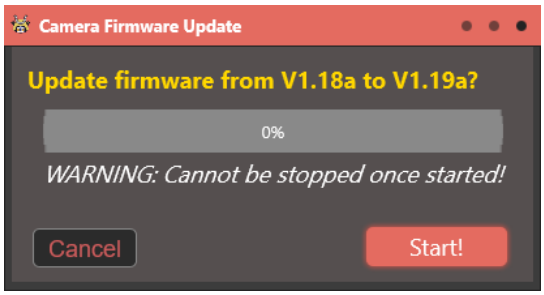
Android, iOS, Mac:

These platforms don't allow apps to search and link to remote devices automatically. Instead, users will need to:

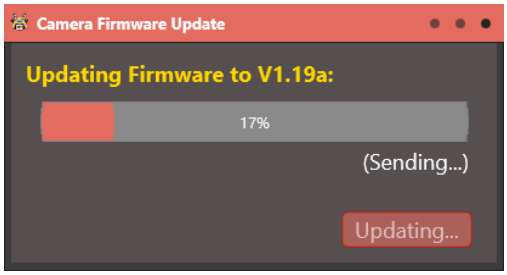
1) Open the settings menu and find the WiFi network selector.
2) Look for a camera. They will start with "RCS" and then the serial # of the camera. Select this new WiFi network to link to.
3) Enter the password. This defaults to: rcspassword
4) Wait for the link to complete. You may get a warning message about not having internet access – ignore this warning and keep the link.
5) Tap the Setup new Ronin Camera using WiFi ... button. The app will find and link to the camera automatically from this point.

II.c.2. Firmware Update (Windows USB Link Only)

If connecting to a camera with a Sentinel or the Windows version of the app and using a USB cable then the app will automatically search and verify the camera firmware version. If a newer version of firmware is available the following window will appear:



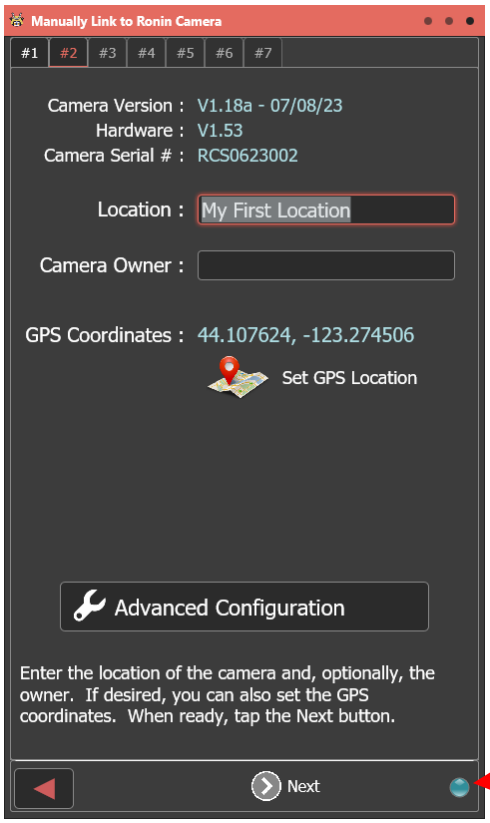
Tap Start! to begin the firmware update process:



While updating the progress bar will show how far along it is. You CANNOT interrupt this process or the camera will be rendered inoperable, so make sure the computer and camera are stably connected before performing this process.

II.c.3. Add Camera Step #2 – Location

Across the top are seven tabs representing the 7 basic steps in setting up a camera for use. At the bottom are Next and Back buttons for moving forwards and backwards in the setup process.



The app tab asks for the **Location** the camera is installed in and optionally the **Camera Owner**. For iOS and Android, the virtual keyboard automatically appears whenever it is needed and will disappear when not being used.

This step also shows the camera firmware and hardware version, the factory assigned serial number, and the current GPS coordinates as determined by the internal GPS chip (or assigned manually by you).

If you want to manually set the GPS location or review where the location is currently set to, tap Set GPS Location to see the position on a live map view (internet network connection is required for the live map to function).

The Advanced Configuration button takes you to another set of programming screens where you can completely control all aspects of the camera's operation. See Section III.d. for a description of these camera settings.

II.c.4. Add Camera Step #3 – Live View

After setting the Location the next tab displays the current camera Live View. This can be used to:

- Verify the Video and FLIR Thermal cameras are functioning as desired.
- Set the Video and FLIR Thermal camera parameters such as resolution, view mode, etc.
- Make sure the cameras are pointed at what you want to capture. Note that this only applies if the Ronin Camera is physically in the final location you want it to be. Most of the time the camera will be moved after you set it up to its final position, so this ability is not usually needed at the initial setup.

A live view will look something like this:

While the view is active you can tap any of the option buttons (IR Image, Tracker, Visual, Color, and Resolution) to change camera settings. You can also tap on either the FLIR or Video camera image to zoom in on it, or check/uncheck the FLIR and Video checkboxes to enable/disable specific cameras.

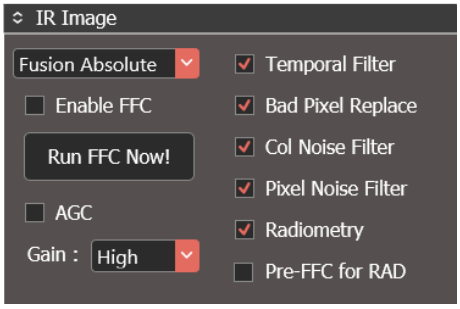
Live View Options:

Option	*Description*
Enable FLIR	Tap this checkbox to turn ON or OFF the FLIR Thermal Imaging camera view.
Enable Video	Tap this checkbox to turn ON or OFF the Video Camera view

FLIR Camera Controls:

IR Image

Tapping this button displays the main FLIR Infrared Image controls:



- **View Mode:** Selects the mode to display the FLIR thermal image. The default is "Color Tracker", but you can choose from:
  + Raw
  + Grayscale
  + Fusion Relative
  + Color Tracker
  + Fusion Absolute
  + Quad Mode
  + Rainbow

  "Quad Mode" splits view into four separate displays of Grayscale, Fusion Absolute, Color Tracker, and Rainbow. See Section III.c.2 for more information.

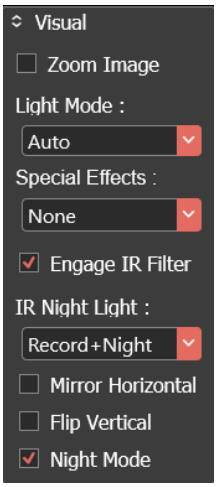
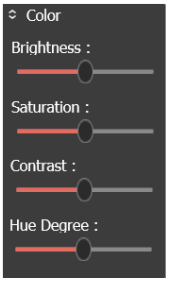
IMPORTANT: The Ronin System allows you to change the view mode of any captured image or video after it has been recorded! This means it does not matter what view mode you pick here because you can always change it later using the View Images/Video function. Your choice here only sets the default view mode for the image or video and what format will be used when the image or video is sent to you by an email or text alert.
See Section VI for more information on this very useful ability.

- **Enable FFC:** Turns on the Flat Field Correction function of the FLIR camera.
- **Run FFC Now:** Runs the Flat Field Correction function one time.
- **AGC:** Turns on or off Auto-Gain Control (defaults to Off).
- **Gain:** Manually sets the gain to Low, High, or Auto (defaults to High).
- **Temporal Filter, Bad Pixel Replace, Col Noise Filter, Pixel Noise Filter:** These options improve the quality of the FLIR image by adding specific filtering and replacement functions. They default to ON and should be left that way for most users.
- **Radiometry:** Enables using a temperature controlled scale for FLIR camera output. This provides a more accurate picture of the scene regardless of the external temperature. Defaults to ON.
- **Pre-FFC for RAD**: Check to turn on running the Flat Field Correction before capturing any images when Radiometry is enabled. This can help improve the image in Battery Only mode.

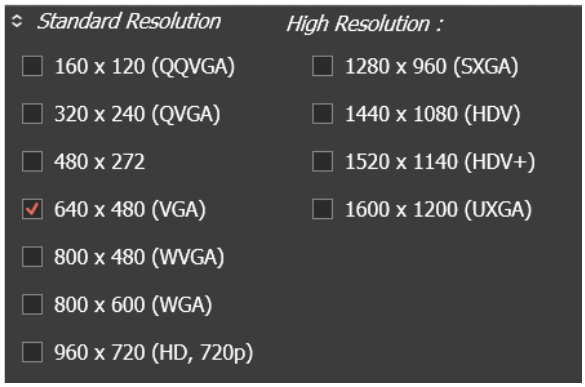
Tracker

Tapping this button sets the options when Color Tracker or Quad View mode is selected. These settings adjust how the Color Tracker image is displayed:

- **Min Change:** The minimum difference (in 0.01 degrees Celsius) between the background and the new pixel for it to qualify as *Active* and should be shown in color instead of black and white.
- **Min Grouping:** The minimum number of pixels that must be active and next to each other to maintain their active status. This helps eliminate isolated pixels that are not part of a larger object being shown as active.
- **Color Amplifier:** The amount of color amplification that should be applied to active pixels to make them stand out more.
- **Retune Rate:** How quickly the camera should adjust to background changes to make a new non-active value. Increasing this value makes the camera less able to adjust to changing background temperature, but less likely to tune out slow moving objects in the field.
- **Max ON:** The maximum number of seconds a pixel can be active before it is assumed to be a new part of the background.
- **Show in Fusion:** Check to color the active pixels the same color as Fusion Relative.

	• **Use Negative:** Check to use pixels that are both colder than the background (negative) and warmer than the background (positive). Unchecked then only the warmer are used. • **Use Active Pix:** When checked the coloring of active pixels is determined only by the range of temperatures of the active pixels themselves. When unchecked, then the entire image temperature range is used to determine the color of the active pixels.
Reset Color Tracker	When Color Tracker or Quad View is selected for the FLIR View it will show the current Color Tracker based image. This uses the known background temperature to display everything non-moving in gray and only show in color those pixels that are *Active Motion* and different than the background. However, when a camera is first placed it takes it some time to determine the background temperature map. Tapping this button jumpstarts this tuning to the background and forces the camera to immediately tune to the current view as the new background temperatures. The view will immediately change to all grays and from then on only new motion will show up in color.
Visual	The Visual options control how the video camera displays images:  • **Zoom Image:** Check to zoom the video camera in. • **Light Mode:** Controls how the camera adjusts to light conditions. Choose from: + Auto + Sunny + Office + Cloudy +Home • **Special Effects:** Various special effects that can be applied to the video camera image including: + None + Blue + Red + Green + Monochrome + Sepia + Negative • **Engage IR Filter:** The camera has a special mechanical filter that it automatically puts over the camera during the day and removes it at night. This greatly improves the camera image during each time and is normally controlled automatically by the system. However, you can manually Engage (filter is over the lens) or Disengage (filter is removed from the lens) using this check box. • **IR Night Light:** Built into the camera is a high power infrared night light that is invisible to humans but visible to the camera and is designed to illuminate the camera view up to 60' away at night. This light is usually turned on automatically by the camera, however there are some options that can control how it is used: + Disabled (never turn on this light) + Low Light Only (turns on whenever the light level gets low at night) + Auto On (turns on and stays on, not recommended unless wall power connected and the camera is permanently in the dark!) + On Recording (turns on whenever capturing images or video regardless of light level) + Record+Night (turns on whenever capturing images or video when it is dark) This option should only be changed to "Disabled" or "Record+Night" unless the user has a very good understanding of the power modes and the usage of the camera night light. • **Mirror Horizontal & Flip Vertical:** Check these boxes to mirror the view horizontally or vertically. • **Night Mode:** Enables a special night mode in the camera that makes the view at night of higher quality. Does slightly reduce the quality of daytime views.
Color	The Color button accesses specific video camera view and color settings. Each slider can be increased or decreased to control that aspect of the camera view. 

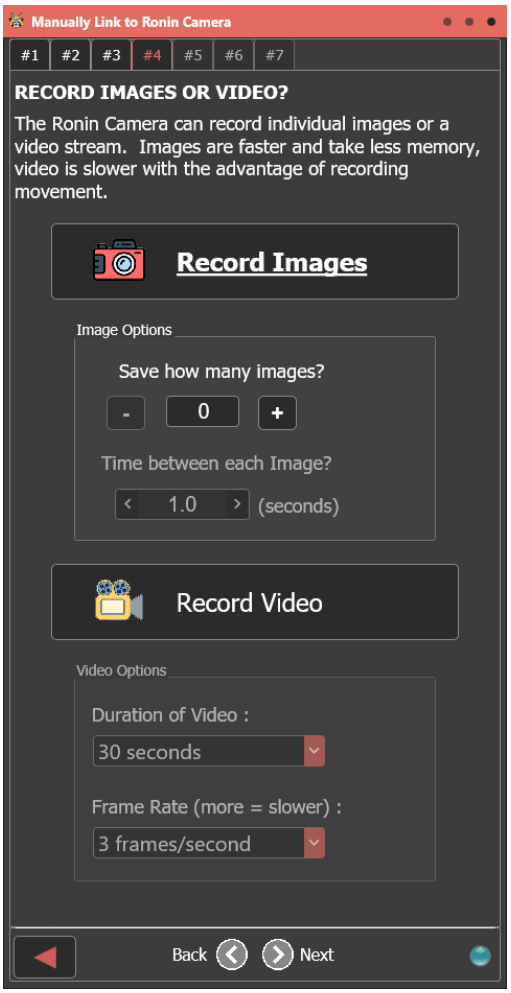
Resolution	The Resolution sets the camera view pixel count from 160x120 to as high as 1600x1200. Note that the higher the resolution the larger the images from the camera. When communicating pictures by radio it is important to not pick such a high resolution, especially if also collecting video, that the transmission rate slows down to the point of making the system less useful. When using radio to connect to the Ronin Camera, we recommend not using higher than 1440x1080 for Images and not higher than 960x720 for Video data collection.



II.c.5. Add Camera Step #4 – Record Images or Videos

Once the Live View has been configured, the next step is to select between recording Images or Videos. The Ronin Camera can actually do both at the same time, however this raises some complex issues and must be configured using the advanced settings described in Section III.d.

Most users will want to collect either Images or Videos:



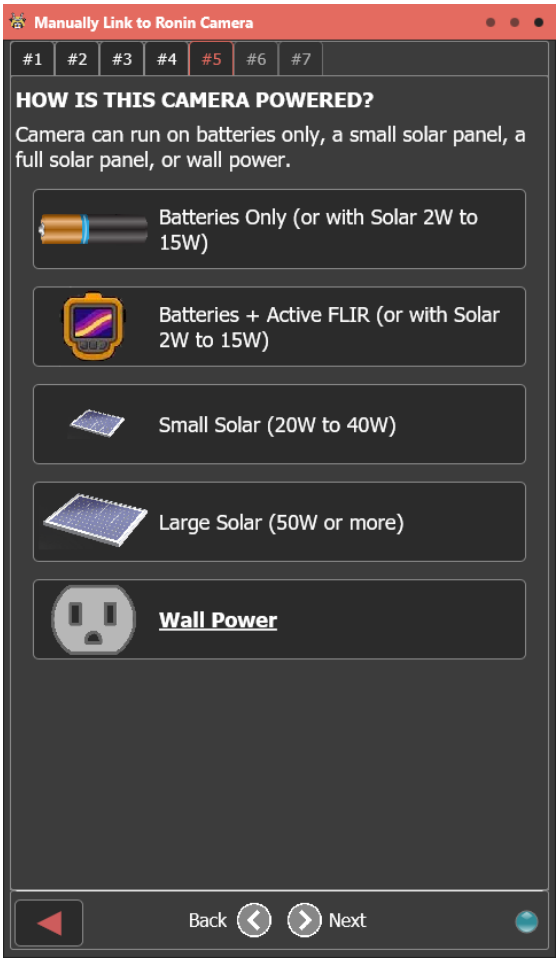
Tap Record Images or Record Video. If Images is selected, you can also select the number of images you want to capture when motion is detected and how long of a delay between each image the camera should use once it starts capturing.

Note that when sending alerts out by email and/or text message, the camera only attaches one image no matter how many are captured. This will be the middle image of the set, so if 3 images are captured it will be the second image that is included with the alert message.

When capturing Videos, you can then choose how long of a video to record and the frame rate of the video (from 9 frames per second to 1 frame per three seconds). It is very important to understand that videos can take a VERY long time to send by radio. The longer the video and the higher the frame rate the longer it will take to send the video.

When recording videos for radio transmission, we recommend no longer than 5 seconds in duration using a frame rate of 3 frames per second or slower. This will typically result in a video being received in 3-15 minutes (depending on the video camera resolution). If you do not mind the wait, then selecting a longer duration or higher frame rate is acceptable, although you should also note that it requires power to transmit the video and using a medium or large size solar panel or wall adapter is recommended. In addition, only one camera at a time can transmit images or videos so tying up the system in downloading a long video will block other cameras for long periods of time.

II.c.6. Add Camera Step #5 – Power Mode



The Ronin Camera has five different power modes for different situations. Each power mode has advantages and disavantages as described below.

Also note about the power modes:

1) Even in Battery Only and Batt+FLIR mode a solar panel can still be connected. This can greatly extend the life of the mode and is completely acceptable to do.
2) Some locations may be able to use smaller solar panels than the one indicated. It depends considerably on the amount of sunlight and the latitude of the location. More power is always welcome!
3) The Ronin Sentinel can automatically download images from cameras connected by radio and in Battery Only and Batt+FLIR mode. This does, however, reduce the length of time the batteries will last. It does this by detecting when the camera wakes up at the top of each hour and then downloads the new pictures at this time.
4) Color Tracker view mode is only useful in Small Solar, Large Solar, and Wall Power modes. This is because the camera saves power by not monitoring the background temperature of the scene unless you are using one of these higher power modes.

Power Option	*Description*
Batteries Only (or with Solar 2W to 15W)	The lowest power mode. Both FLIR and Video camera are turned off and the Radio is kept off except for 1 minute at the top of each hour. Cannot access camera remotely by radio except at the top of each hour. Time from detection to recording an image is about 3 to 5 seconds (if the FLIR is enabled), or about 0.5 seconds if the FLIR is not enabled. Camera will typically last 4-6 months when the Radio is disabled, less if the Radio is enabled and pictures are actively being downloaded.
Batteries + Active FLIR (or with Solar 2W or 15W)	One step up from Batteries Only with the FLIR camera being kept on. This greatly speeds up the time to first picture because it does not have to turn on the FLIR and let it warm up. Users cannot access camera remotely by radio except at the top of each hour. Camera will typically last 1-2 weeks when the Radio is disabled, less if the Radio is enabled and pictures are actively being downloaded.
Small Solar (20W to 40W)	The FLIR Camera and the Radio are kept on all the time. Users can access a live view at any time and the time from detection to first image is ~0.5 seconds. Email and/or text alerts are sent out whenever motion is detected. The Sentinel is updated once per hour as to the camera's current status. Camera will typically last indefinitely as long as the solar panel keeps providing power.
Large Solar (50W or more)	The FLIR and Video cameras are kept on all the time. Either the Radio or WiFi link is also kept on and users can access a live view whenever desired. Time from detection to first image is ~0.1 seconds. Camera will typically last indefinitely as long as the solar panel keeps providing power.

Wall Power	All features and functions are kept on all the time. Either the Radio or WiFi link is also kept on and users can access a live view whenever desired. Time from detection to first image is ~0.1 seconds. The main difference between Large Solar and Wall Power is that the camera updates the Sentinel every minute in Wall Power mode and once every 15 minutes in Large Solar Mode. Camera will last indefinitely as long as power is available.

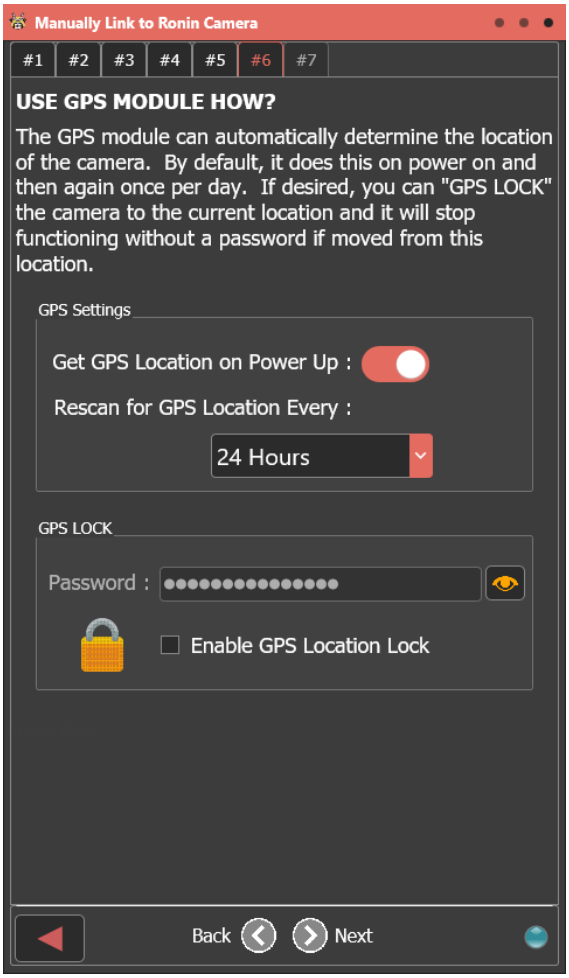
RONIN CAMERA POWER MODE FEATURE TABLE:

NOTE: Time measurements below assume a 9AHr LiFEPO4 battery pack charged to a 9.6V level

Parameter	*Mode 0: Battery Only*	*Mode 4: Batt + FLIR*	*Mode 1: Small Solar*	*Mode 2: Large Solar*	*Mode 3: Wall Power*
Estimated Battery Life	4-6 Months	1-2 Weeks	Infinite	Infinite	Infinite
Max Number of Images	38,000	50,000	Infinite (to limit of SD Card)	Infinite (to limit of SD Card)	Infinite (to limit of SD Card)
Estimated Battery Life if Input Power fails	N/A	N/A	4-5 Days	2-3 Days	1-2 Days
FLIR Camera ON	Only on Detection	Yes	Yes	Yes	Yes
Video Camera ON	Only On Detection	Only On Detection	Only On Detection	Yes	Yes
Trigger Time (Delay from detection to Image Capture)	~3 to 5 seconds	~0.5 seconds	~0.5 seconds	< 0.12 seconds	< 0.12 seconds
Passive IR Motion Detection	Yes	Yes	Yes	Yes	Yes
FLIR Motion Detection	No	No	Yes	Yes	Yes
“Color Tracker”	No	No	Yes	Yes	Yes
Radio is ON (when enabled)	For 60 seconds once per hour	For 60 seconds once per hour	Yes	Yes	Yes
Radio Status Updates	Once per hour	Once per hour	Once per 30 min	Once per 15 min	Once per minute
Radio Detect Alerts	No	No	Yes	Yes	Yes
Radio: - Access Live View - Download Images - Setup Camera	Only if initiated during 60 second On period once per hour	Only if initiated during 60 second On period once per hour	Yes		
WiFi is ON (when enabled)	No	No	For 60 seconds once per hour	Yes	Yes
WiFi Status Updates	No	No	Once per hour	Once per 15 min	Once per minute
WiFi Detect Alerts	No	No	No	Yes	Yes
WiFi: - Access Live View - Download Images - Setup Camera	No	No	Only if initiated during 60 second On period once per hour	Yes	Yes

II.c.7. Add Camera Step #6 – GPS

Ronin Cameras have a built-in GPS module to capture the location of the camera. Step #6 allows you to setup how this function is used and if you want to lock the camera to a specific location for security purposes:



Option	*Description*
Get GPS Location on Power Up	Set this to ON if you want the camera to automatically scan for the current GPS location of the camera when it is first powered up.
Rescan for GPS Location Every	Select the length of time you want to automatically recheck the GPS location after the first time.

GPS Lock:

Enable GPS Location Lock	If this is checked the Ronin Camera will save the current GPS location and LOCK it into its memory. When it rescans for the location, or the next time it is powered on, if the location it gets is different than the locked location into the camera it will stop functioning until it receives a password from the user. In effect the GPS Location Lock will "brick" the camera until it receives a password if it moved from its location. This is an anti-theft feature which can help deter anyone who might steal the camera since it becomes useless unless it is returned to its original location.
Password	The password that must be entered to unlock the camera from a GPS location lock.
Always Require a Password	If checked, then passwords are enabled for accessing the camera anytime and not just when it is location locked. Users may want to enable passwords for increased security.

II.c.8. Add Camera Step #7 – Communication & Connection to Sentinel

As mentioned before, the final step establishes how the camera will be connected to a Sentinel. If you don't have a Sentinel in the system, the ONLY option will be Use the SD Card Only . For

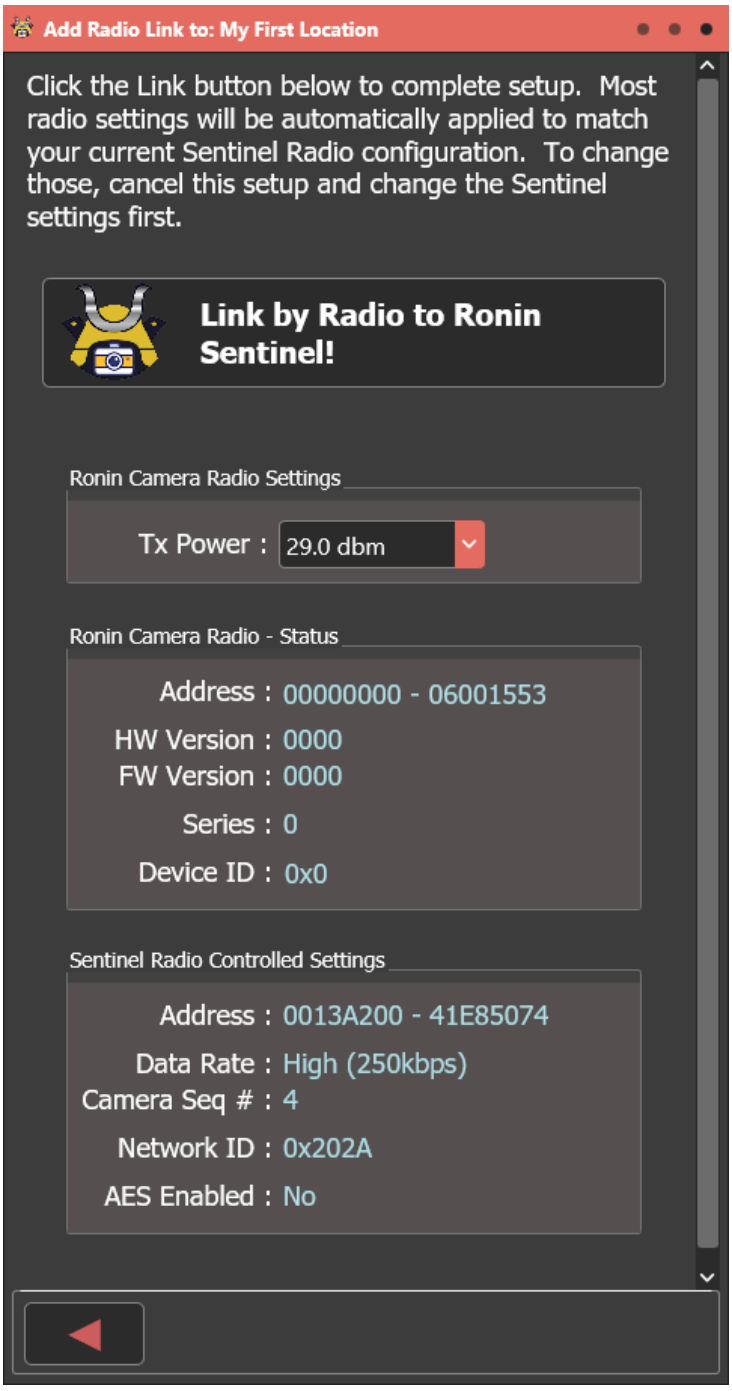
The four options are:

+ By Ronin Sentinel Radio
+ WiFi Connection
+ Use SD Card Only
+ USB or Serial Cable Connection

Option	*Description*
By Ronin Sentinel Radio Link	This is the most common option and connects the camera to the Ronin Sentinel using the built in radio. This option works regardless of camera power mode. When setting up the first camera you will be asked to select a "Speed Mode" for the radio. All cameras must use the same speed mode so it is important to choose a mode based on the furthest distant camera in the system. See section II.g.1. for details.
Use the SD Card Only (turn everything else off)	Turns off all communication features and sets the camera to only record images and videos to its built in SD Card. This is the lowest power mode.
WiFi Connection to local network	Connects the Ronin Camera to a local wireless network and then links the Ronin Sentinel to this camera. This works the same as when connected by radio, but the speed is faster because it is being connected by WiFi. Must select Small Solar, Large Solar, or Wall Power to use this mode.
USB or Serial Cable Connection	Adds the camera to the Ronin Sentinel using the USB connection. This option is not commonly used, but Ronin Cameras can work directly connected to the Sentinel in this manner.

II.c.8.i. Radio Connection

When selecting connection by Radio, the following screen is shown:

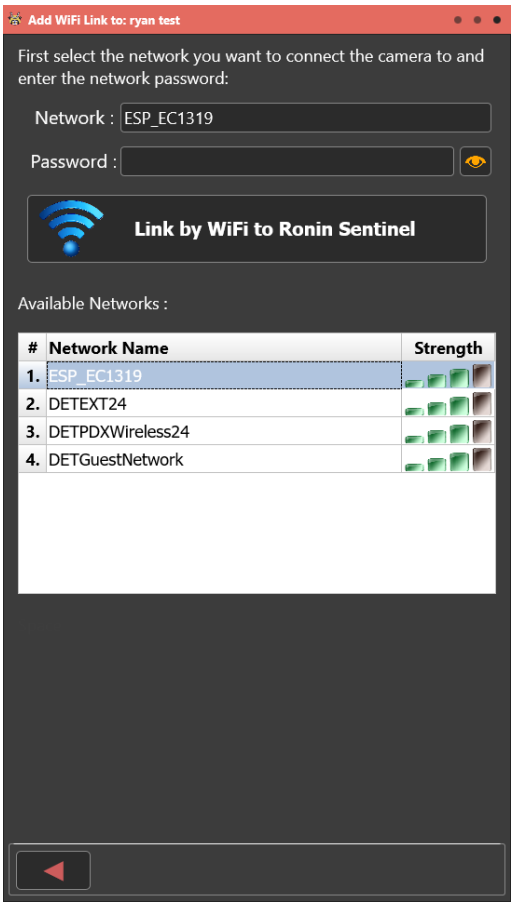


Set the “Tx Power” and tap Link by Radio to Ronin Sentinel.

Typically, you can use the max Tx Power of 29.0 dBm for most installations. However, if you want to save power to make your batteries last longer, or to use a smaller solar panel, then choosing a lower power may be a good option.

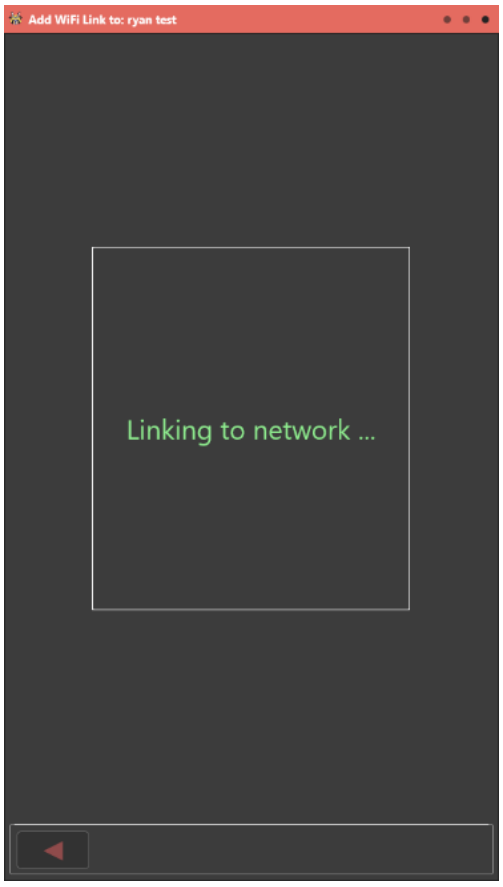
II.c.8.ii. WiFi Connection

Selecting link by WiFi to the Ronin Sentinel will connect the Ronin Camera to your local wireless network and then setup the Sentinel to communicate with it over that connection. The first screen to show is the camera searching for networks it can find:



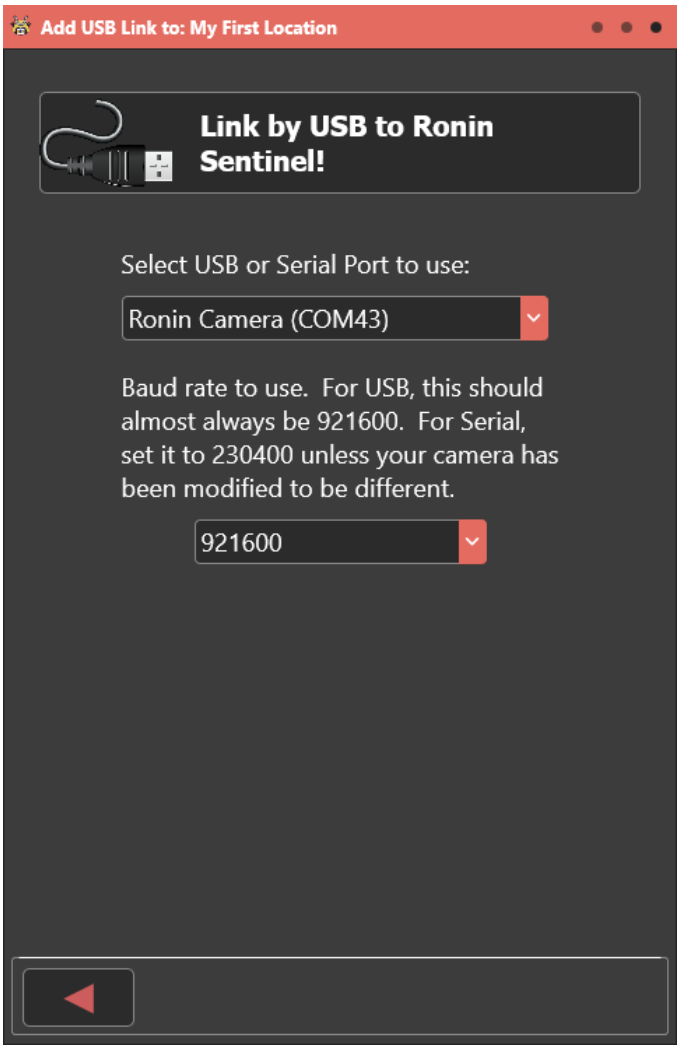
Once the networks have been found, select the one you want to use and then enter the password for that network.

Tap Link by WiFi to Ronin Sentinel to make the link:

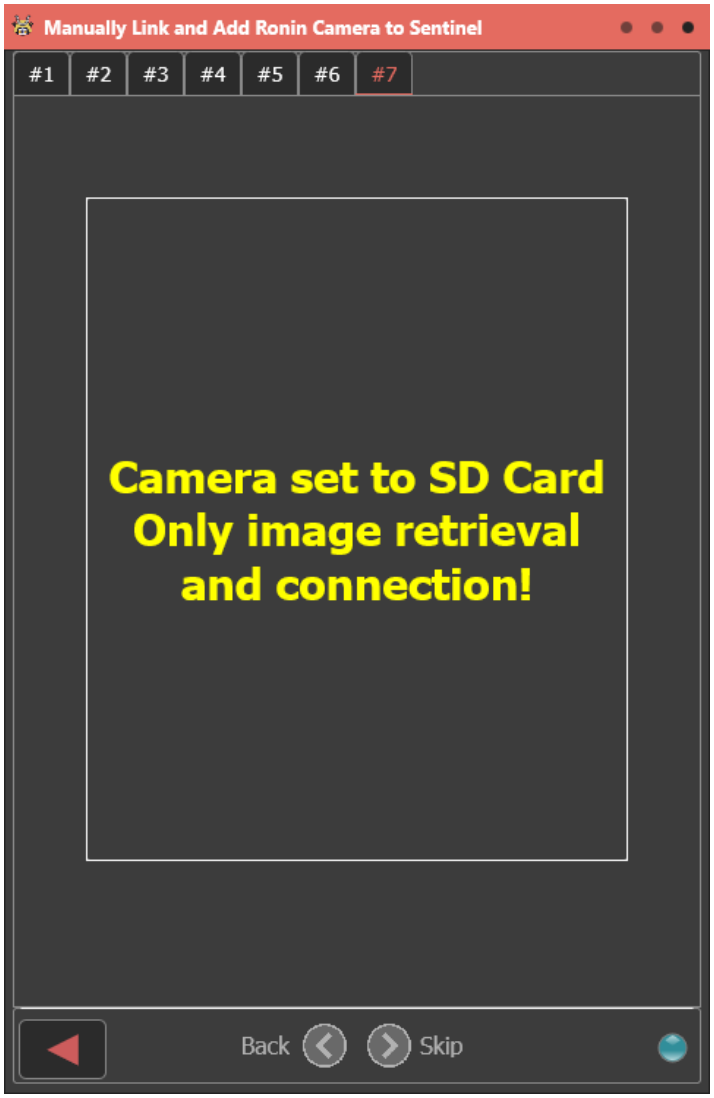


II.c.8.iii. USB Only Connection

If you select linking the camera to the Ronin Sentinel using the existing USB connection, a small window appears that lets you verify you want to make the link. Tap Link by USB to Ronin Sentinel to add the camera to the Sentinel main page and it will be immediately available for full use.



II.c.8.iv. SD Card Only



If you select linking the camera to the Ronin Sentinel using an SD Card Only, a window appears telling you that the way to download images and videos to the Sentinel from this point for this camera will be by SD Card only. See section **III.b. Importing & Exporting Images & Videos** for more information on this process.

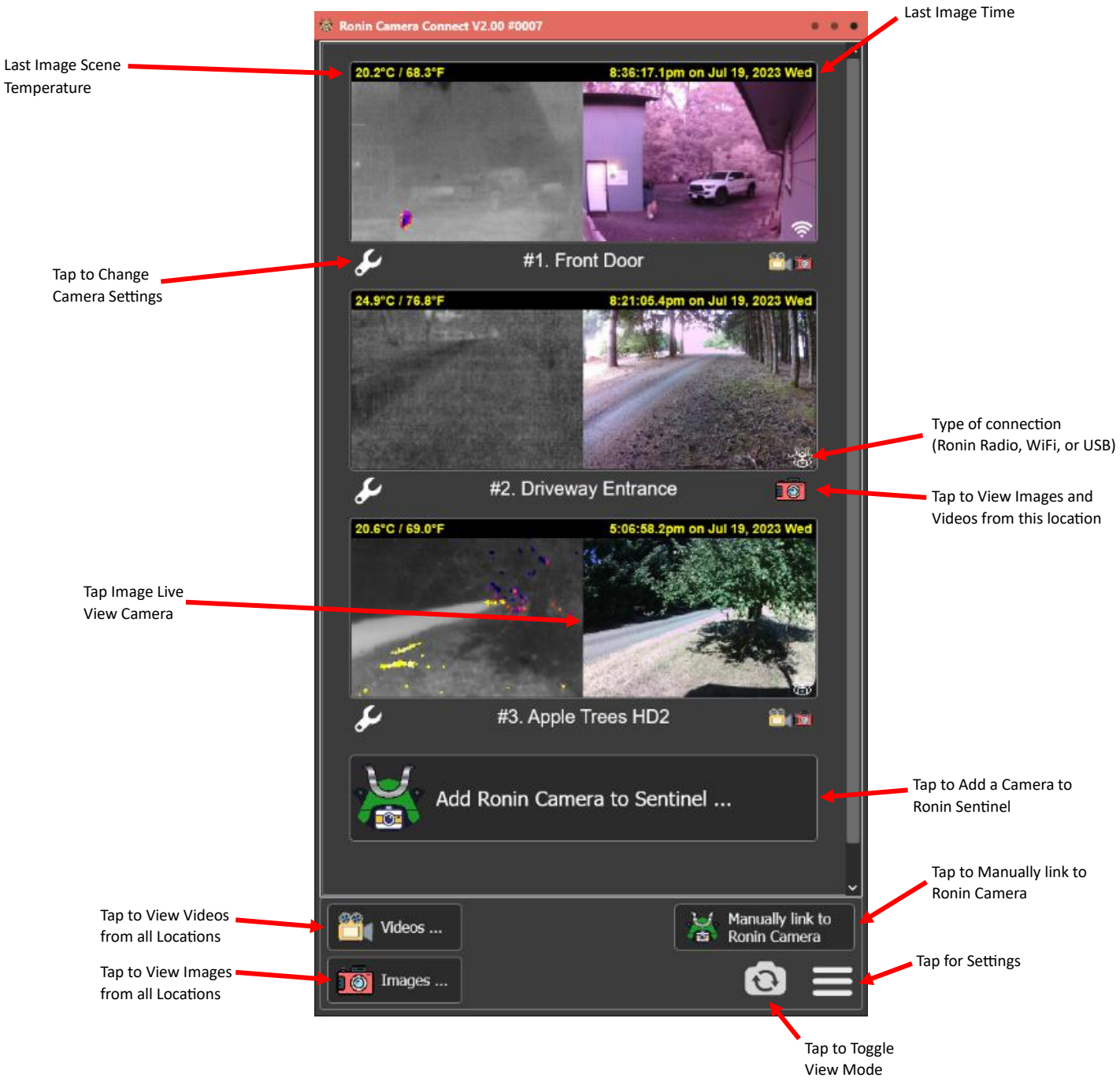
III. Ronin Camera Link App with Sentinel

Having your app linked to a Sentinel brings many benefits. The Main Link screen instantly displays the current status of all the cameras in the system and allows you to quicky View Images or Videos, Live View or Change Camera Configuration of any connect camera, and to see the last captured image from the cameras. This is a great supplement or addition to the email/texting ability of the Ronin Sentinel itself.

III.a. Main Link Screen

The Main Link Screen is where the app spends most of its time. From here you can Live View any connected camera, change Camera Settings, view any downloaded Video or Image, add new cameras. The main screen also shows all currently connected cameras and the most recent captured image from that camera.

In this example three cameras have been linked to the Sentinel:



Around each camera is a rectangle that appears to show the camera link status as follows:

Camera status rectangle:

Brown: Downloading an image or video from a motion alert received by the Sentinel from a remote camera.

Green: Received a new alert and Sentinel sent out motion alert email/text message (stays green for 60 seconds after the motion alert image or video is downloaded).

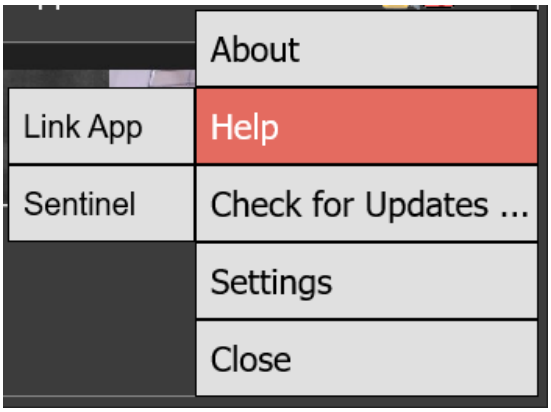
Cyan: Camera in Battery Only mode has established a link at the top of the hour and is ready to communicate.

Yellow: Camera Settings being accessed by the Sentinel or another program running the link app.

White: Camera Live View being accessed by the Sentinel or another program running the link app.

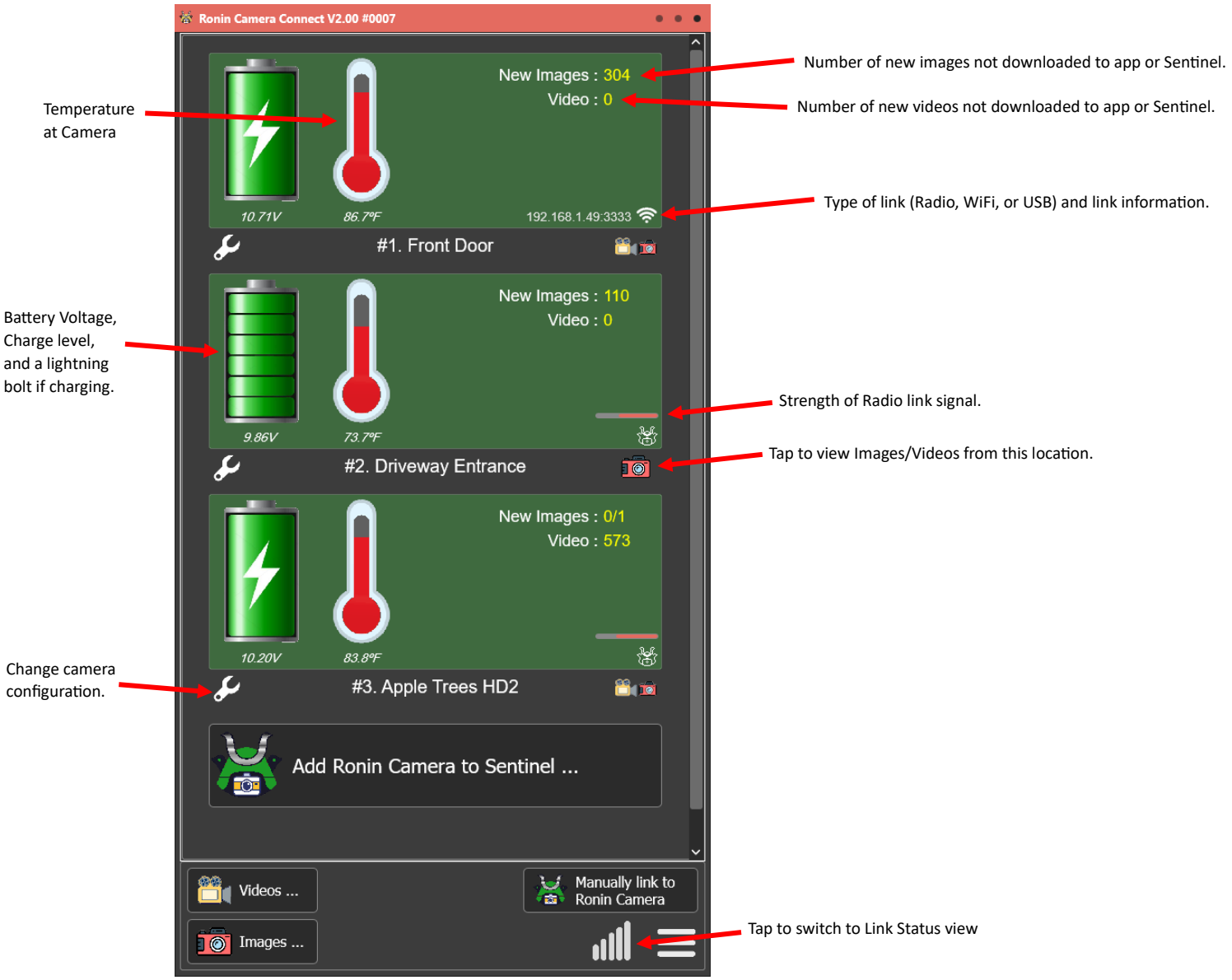
When downloading an image or video from camera, a status bar appears here showing you the progress of the download.

MENU OPTIONS: Tapping the setting button shows the following menu options:



III.a.1. Toggle to Camera Status

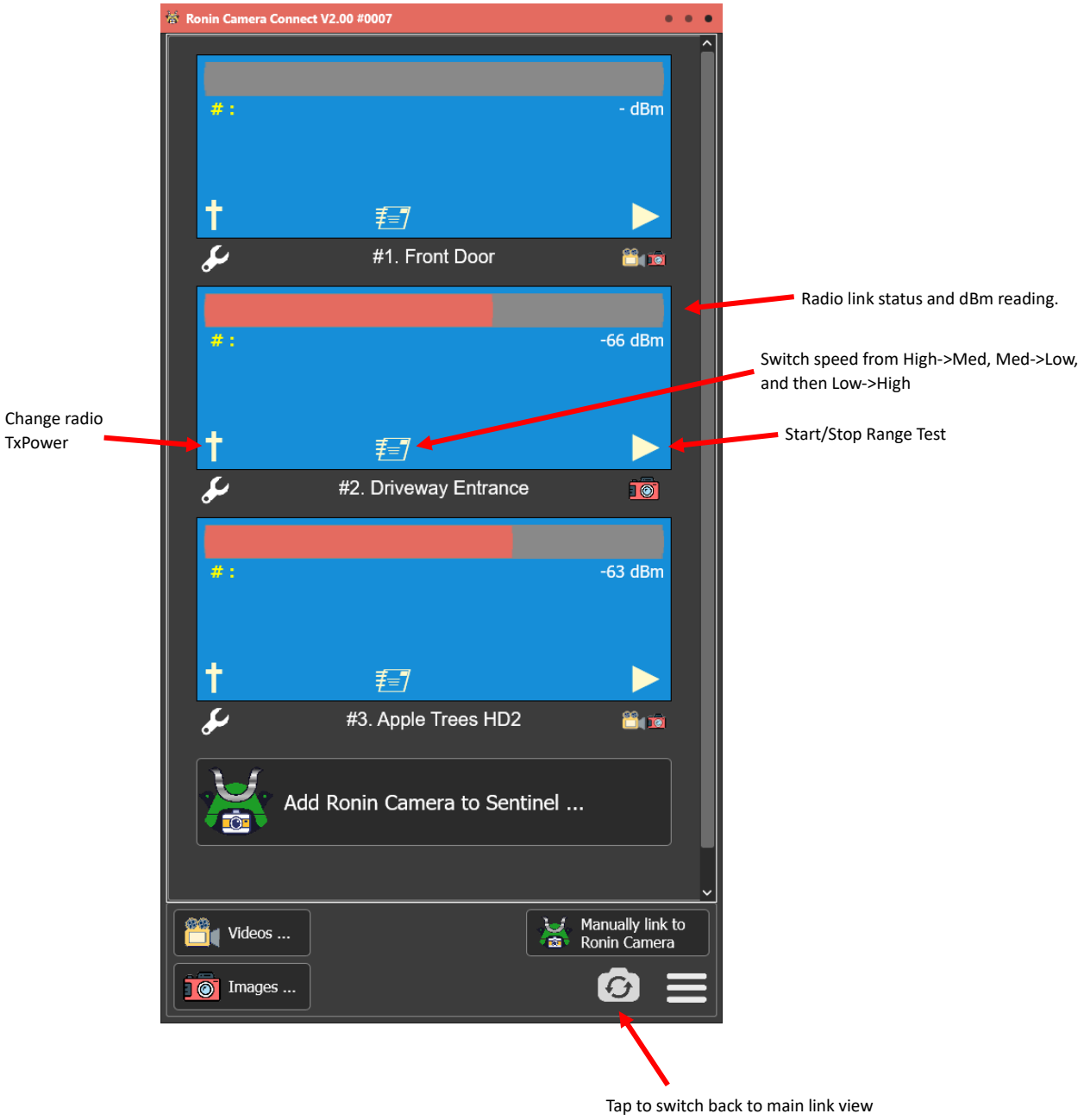
The main screen supports three view modes for the cameras. The primary mode is the main screen described in the previous section. However, if you tap the button you can switch to the Camera Status View, and then tap to switch to the Link Activations View, and finally tap to switch back to the Main Link Screen:



The Camera Status View shows the battery status, new images and videos, current temperature, and specific link information for each camera.

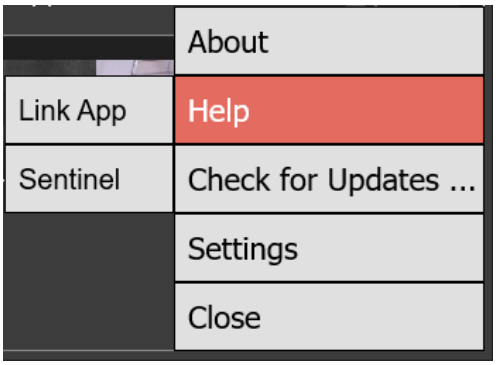
III.a.2. Toggle to Link Status

The Link Status view shows a bar at the top which highlights the signal strength of the received radio packets. This screen is useful for changing the radio rate and strength and is described in more detail in the Ronin Sentinel User Manual Section VIII.a.

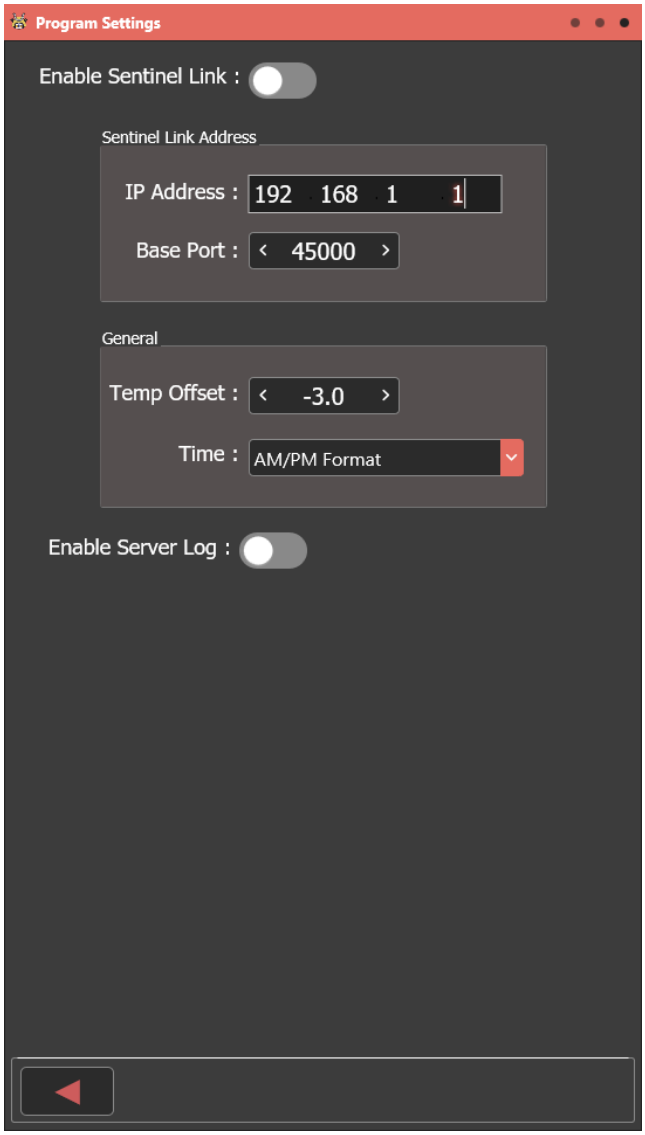


III.a.3. App Settings

Tapping the setup button shows a menu with various options:



Tapping on the Settings button shows the following:



You can enable or disable the link to the Sentinel with the top slider. The “IP Address” and “Base Port” control how the Sentinel link is made.

“Temp Offset” is a general control over all temperature measurements from Ronin Cameras. This number, in degrees Celsius, will be added to all calculated temperatures to improve the accuracy of the measurement. For example, if the camera scene appears to be 25.0 degrees C from average calculations, then the app will add “-3.0” to it to get 22.0 degrees C.

The “Temp Offset” can help improve accuracy when your typical scene has hot or cold spots that push the average higher or lower regardless of the true temperature of the scene.

“Time” controls if you want to show times in the standard AM/PM format or if you want to use military time.

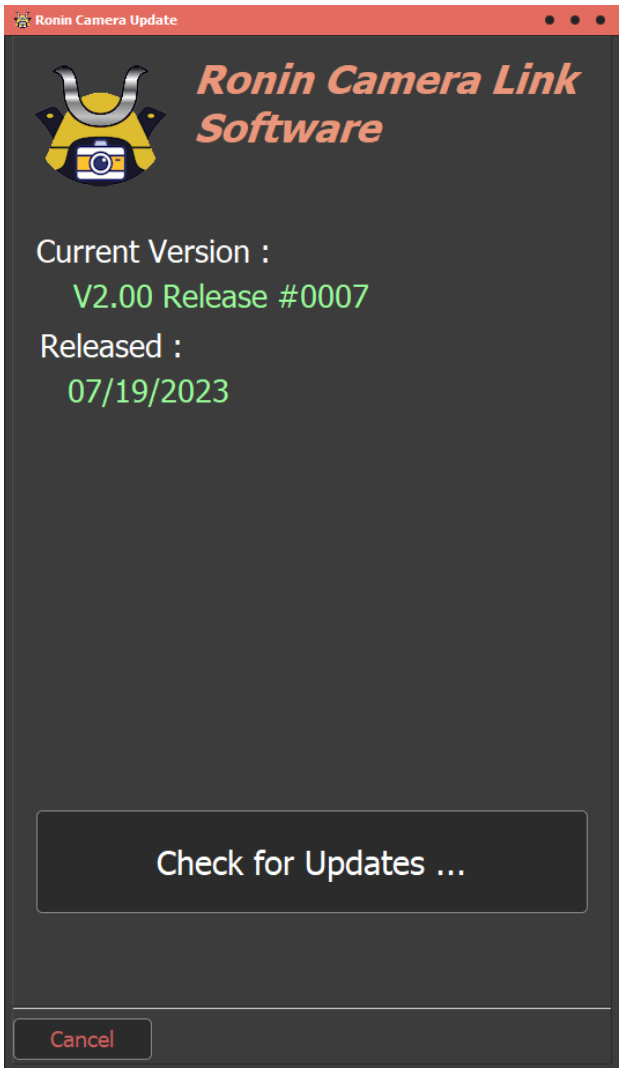
If “Enable Server Log” is enabled a log file is created for all transactions between the app and the Sentinel. This should only be enabled by direction of Diamond Edge to help in tracking down communication issues.

III.a.4 App About

The about window shows the current version of the app and the connected Ronin Sentinel. This information may be needed by Diamond Edge to help with any problem resolution with the system.

III.a.5. Check For Updates

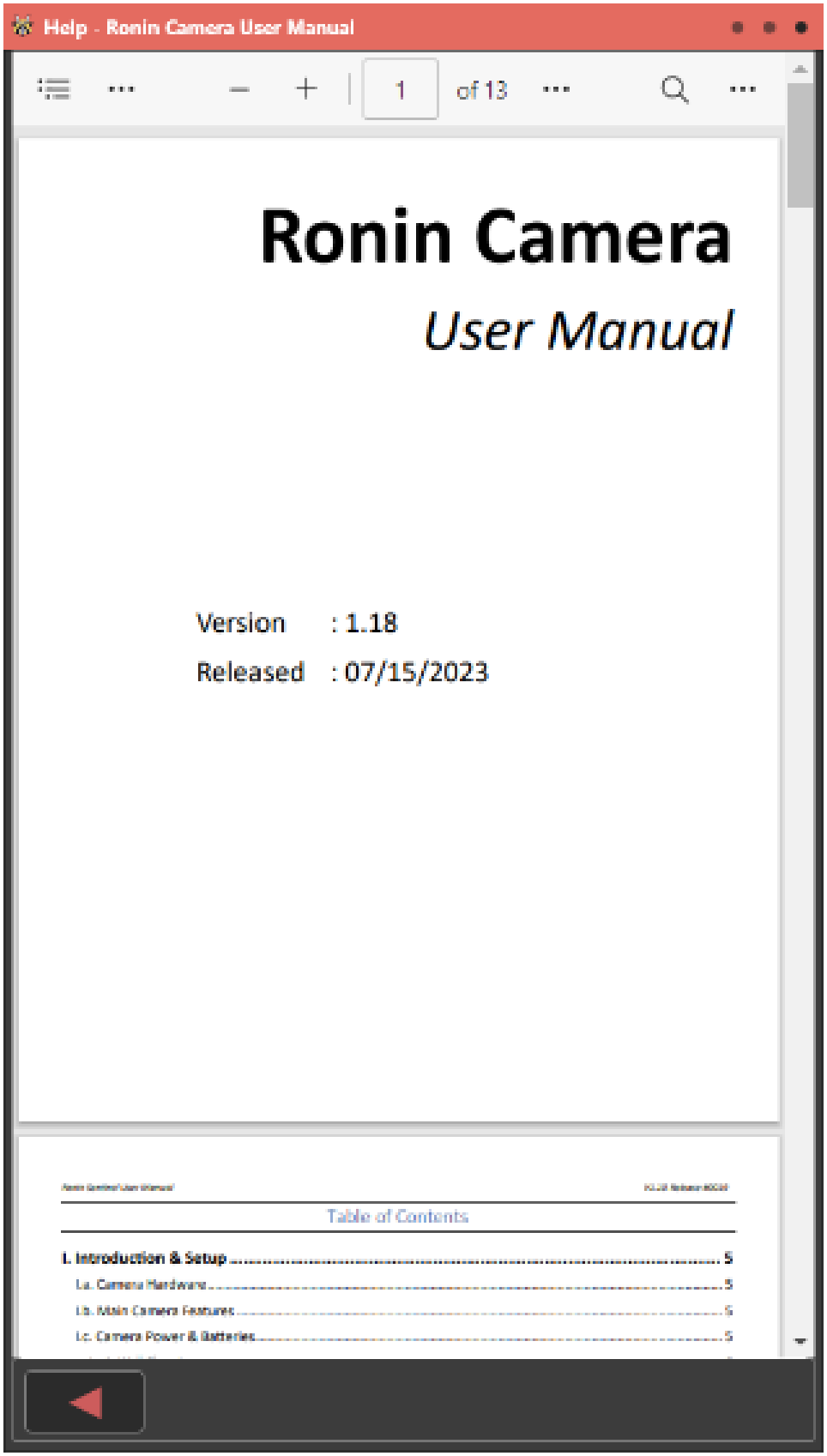
Check for updates accesses the Diamond Edge server for any app updates or camera firmware updates. This is only used in Windows installations (iOS and Android use their respective app stores):



Make sure your internet connection is active and tap Check for Updates to see if there are available app or firmware updates for your system.

III.a.6. App Help

The help menu can directly access both this manual and the Ronin Sentinel user manual. For Android devices only you must have access to the internet to open the help view. For all other platforms and internet connection is not required. When you open the manual a screen like this will appear:



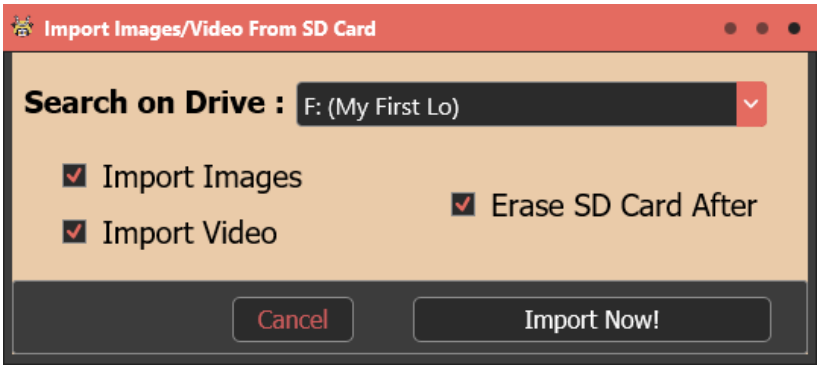
III.b. Importing & Exporting Images and Videos

The app supports importing and exporting videos and images. Note that if a Ronin Sentinel is part of the system it is a better idea to Import and Export to the Sentinel which can then share the files to all connected apps. However, if you are not using a Sentinel or have images and videos stored only on your app device, then it can do an Import/Export as well.

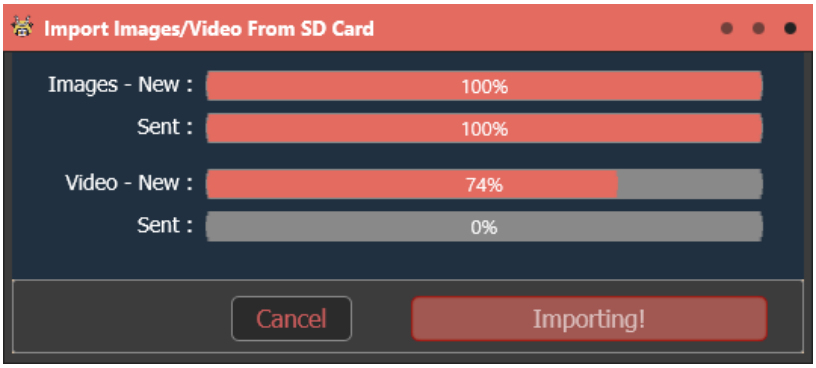
III.b.1. Importing

To import pictures collected by a Ronin Camera or from any other Ronin Sentinel or the Ronin Camera Link App follow the steps below:

1) Insert the SD Card containing the images into a SD card reader and plug it into a USB port on your computer. This is usually the SD card out of a Ronin Camera.
2) A new icon will appear on the screen like this at the bottom right of the screen:  Tap this icon.
3) If the SD Card you insertted contains images and/or videos, a new window will appear like this:



4) Choose what types of pictures to import and whether or not you want to erase the SD card after the data is imported. When ready, tap Import Now!. An import window will appear and show the progress:

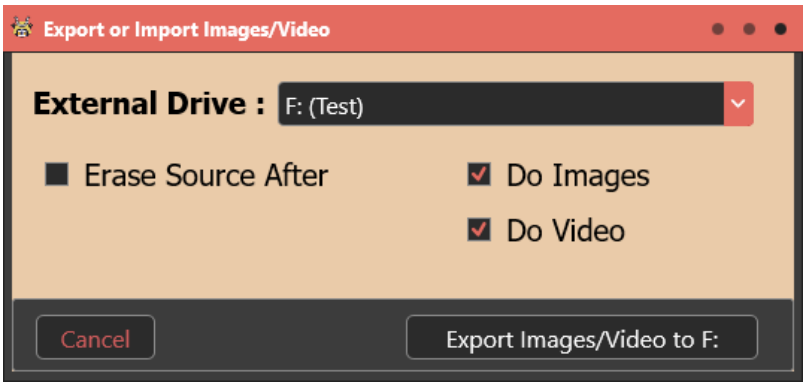


5) When the import completes this window will disappear. You can immediately tap the Videos... or Images... buttons to access the imported pictures.
6) Tap Cancel at any time during the import to halt the process.

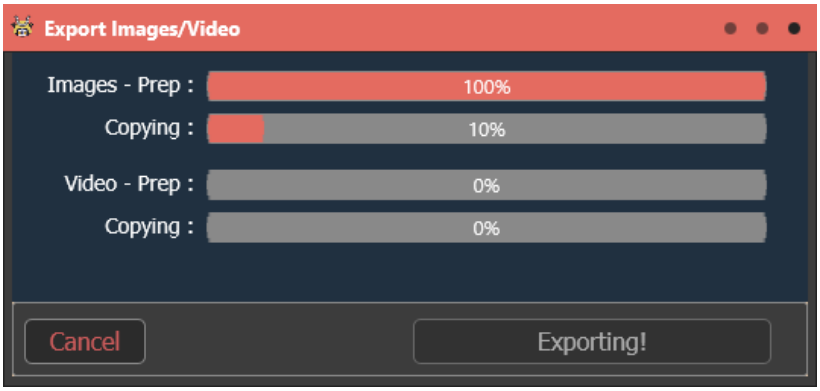
III.b.2. Exporting

Similar to importing you can export the images and videos stored on the app device to a connected drive. To start the export follow these steps:

1) Plug in a USB thumb drive into your device.
2) A new icon will appear on the bottom right of the screen like this:  Tap this icon.
3) An export window will appear like this:



4) Select Images, Videos, or both and select if you want to erase the source after the export. In general, unless your device is low on space, it is recommended to not erase the files to make sure you don't lose your original copy (although the Camera itself will likely also have a copy).
5) When ready, tap Export Images/Video to _ where "_" is the drive letter of the thumb drive. Window shows:

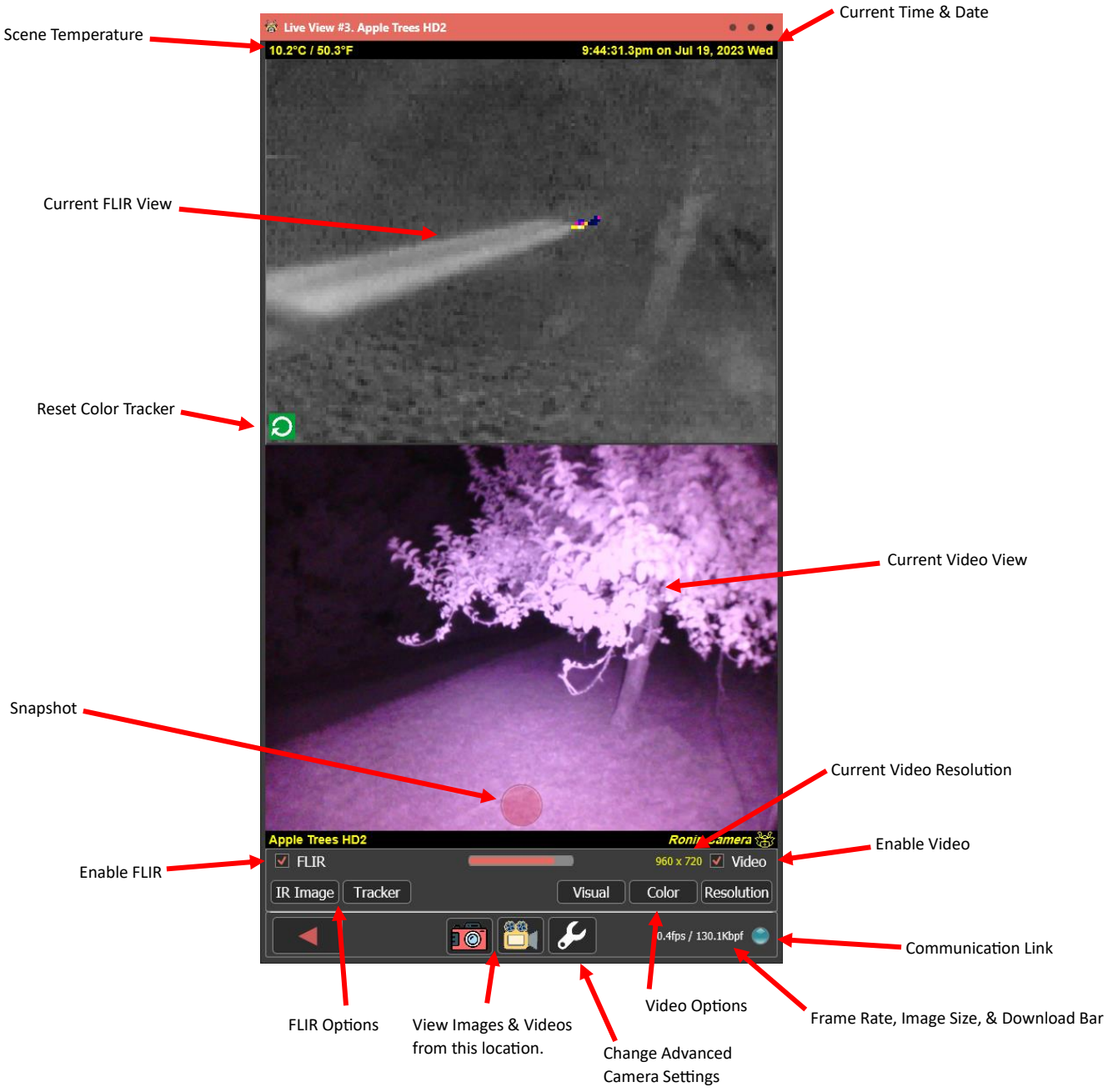


6) When the export finished this window will disappear.
7) Tap Cancel at any time during the export to stop the process.

III.c. Live View

Cameras connected to the Sentinel by any method (WiFi, Ronin Radio, or USB) support a Live View of the current camera scene and your app can access this view through the Sentinel. Cameras that are running in **Battery Only** or **Batt+FLIR** modes are only available for Live View at the top of each hour, and users must start the few within 60 seconds to access the camera. This can be determined when a cyan colored rectangle surrounds the camera on the Main Link Screen.

When the live view starts a screen like this will appear:



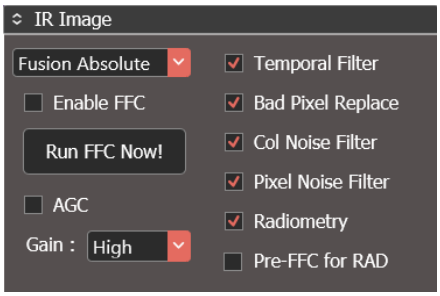
While the view is active you can tap any of the option buttons (IR Image , Tracker , Visual , Color , and Resolution) to instantly change FLIR or Video camera settings. Tap the Change Advanced Camera Settings button to access the advanced camera setup (see Section III.d). You can also tap on either the FLIR or Video camera image to zoom in on it, or check/uncheck the FLIR and Video checkboxes to enable/disable specific cameras.

Option	*Description*
Enable FLIR	Tap this checkbox to turn ON or OFF the FLIR Thermal Imaging camera view.
Enable Video	Tap this checkbox to turn ON or OFF the Video Camera view

FLIR Camera Controls:

IR Image

Tapping this button displays the main FLIR Infrared Image controls:



- **View Mode:** Selects the mode to display the FLIR thermal image. The default is "Color Tracker", but you can choose from:
  + Raw
  + Grayscale
  + Fusion Relative
  + Color Tracker
  + Fusion Absolute
  + Rainbow
  + Quad Mode

  The "Quad Mode" splits the view into four separate displays of Grayscale, Fusion Absolute, Color Tracker, and Rainbow (see below).

IMPORTANT: The Ronin System allows you to change the view mode of any captured image or video after it has been recorded! This means it does not matter what view mode you pick here because you can always change it later using the View Images/Video function. Your choice here only sets the default view mode for the image or video and what format will be used when the image or video is sent to you by an email or text alert.
See Section VI for more information on this very useful ability.

- **Enable FFC:** Turns on the Flat Field Correction function of the FLIR camera.
- **Run FFC Now:** Runs the Flat Field Correction function one time.
- **AGC:** Turns on or off Auto-Gain Control (defaults to Off).
- **Gain:** Manually sets the gain to Low, High, or Auto (defaults to High).
- **Temporal Filter, Bad Pixel Replace, Col Noise Filter, Pixel Noise Filter:** These options improve the quality of the FLIR image by adding specific filtering and replacement functions. They default to ON and should be left that way for most users.
- **Radiometry:** Enables using a temperature controlled scale for the FLIR camera output. This provides a more accurate picture of the scene regardless of the external temperature. Defaults to ON (recommended).
- **Pre-FFC for RAD**: Check to turn on running the Flat Field Correction before capturing any images when Radiometry is enabled.

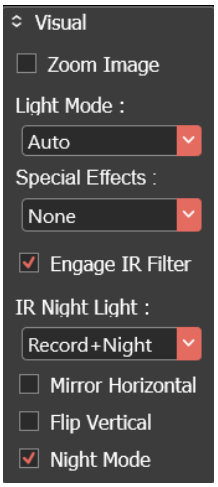
Tracker

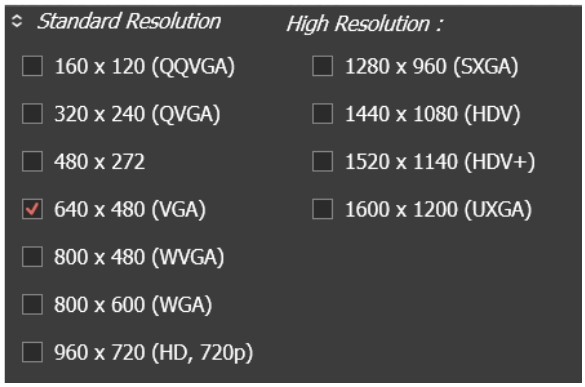
Tapping this button sets the options when Color Tracker or Quad View mode is selected. These settings adjust how the Color Tracker image is displayed:

- **Min Change:** The minimum difference (in 0.01 degrees Celsius) between the background and the new pixel for it to qualify as *Active* and should be shown in color instead of black and white.
- **Min Grouping:** The minimum number of pixels that must be active and next to each other to maintain their active status. This helps eliminate isolated pixels that are not part of a larger object being shown as active.
- **Color Amplifier:** The amount of color amplification that should be applied to active pixels to make them stand out more.
- **Retune Rate:** How quickly the camera should adjust to background changes to make a new non-active value. Increasing this value makes the camera less able to adjust to changing background temperature, but less likely to tune out slow moving objects in the field.
- **Max ON:** The maximum number of seconds a pixel can be active before it is assumed to be a new part of the background.
- **Show in Fusion:** Check to color the active pixels the same color as Fusion Relative.

	• **Use Negative:** Check to use pixels that are both colder than the background (negative) and warmer than the background (positive). Unchecked then only the warmer are used. • **Use Active Pix:** When checked the coloring of active pixels is determined only by the range of temperatures of the active pixels themselves. When unchecked, then the entire image temperature range is used to determine the color of the active pixels.
Reset Color Tracker	When Color Tracker or Quad View is selected the FLIR View will show the current Color Tracker based image. This uses the known background temperature to display everything non-moving in gray and only show in color those pixels that are Active and different than the background. However, when a camera is first placed it takes it some time to determine the background temperature map. Tapping this button jumpstarts it and forces it to immediately tune to the current view as the new background temperatures. The view will immediately change to all grays and from then on only new motion will show up in color.

Video Camera Controls:

Visual	The Visual options control how the video camera displays images:  • **Zoom Image:** Check to zoom the video camera in. • **Light Mode:** Controls how the camera adjusts to light conditions. Choose from: + Auto + Sunny + Office + Cloudy +Home • **Special Effects:** Various special effects that can be applied to the video camera image including: + None + Blue + Red + Green + Monochrome + Sepia + Negative • **Engage IR Filter:** The camera has a special mechanical filter that it automatically puts over the camera during the day and removes it at night. This greatly improves the camera image during each time and is normally controlled by the system. However, you can manually Engage (filter is over the lens) or Disengage (filter is removed from the lens) using this check box. • **IR Night Light:** Built into the camera is a high power infrared night light that is invisible to humans but visible to the camera and is designed to illuminate the camera view up to 60' away at night. This light is usually turned on automatically by the camera, however there are some options that can control how it is used: + Disabled (never turn on this light) + Low Light Only (turns on whenever the light level gets low at night) + Auto On (turns on and stays on, not recommended unless wall power connected and the camera is permanently in the dark!) + On Recording (turns on whenever capturing images or video regardless of light level) + Record+Night (turns on whenever capturing images or video when it is dark) This option should only be changed to "Disabled" or "Record+Night" unless the user has a very good understanding of the power modes and usage of the camera night light. • **Mirror Horizontal & Flip Vertical:** Check these boxes to mirror the view horizontally or vertically. • **Night Mode:** Enables a special night mode in the camera that makes the view at night of higher quality. Does slightly reduce the quality of daytime views.
Color	The Color button accesses specific video camera view and color settings. Each slider can be increased or decreased to control that aspect of the camera view. 

Resolution	The Resolution sets the camera view pixel count from 160x120 to as high as 1600x1200. Note that the higher the resolution the larger the images from the camera. When communicating pictures by radio it is important to not pick such a high resolution, especially if also collecting video, that the transmission rate slows down to the point of making the system less useful. When using Radio to connect to the Ronin Camera, we recommend not using higher than 1440x1080 for Images and not higher than 960x720 for Video data collection.	

III.c.1. Snap Camera Image

Tap the red Snap button at any time to capture the current camera image (just like any camera).

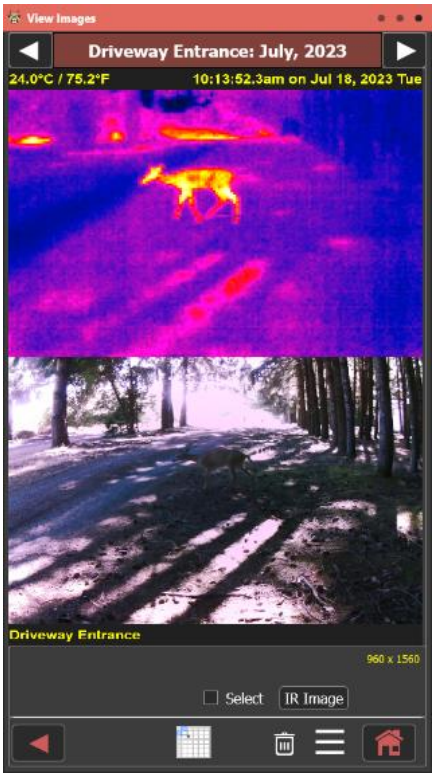
A small capture window will appear and float into the Images box at the bottom of the screen.

III.c.2. FLIR View Mode

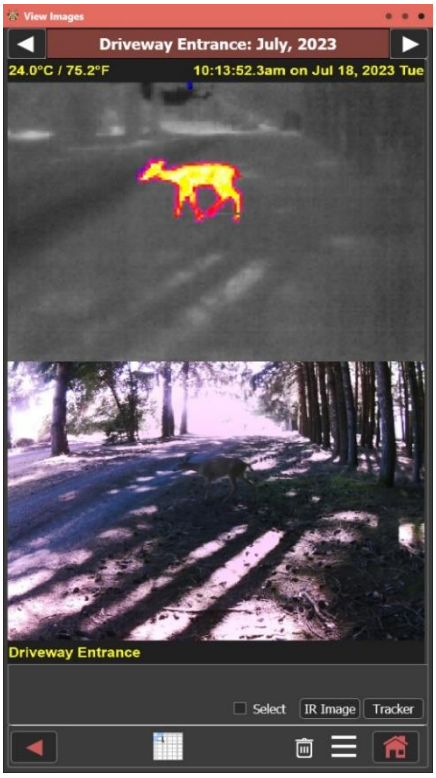
The FLIR camera has multiple view modes. These modes are available both during a Live View and for any saved image or video. The app supports changing the view mode on any picture *even after it has been downloaded*.

The following shows an example of the same picture in each of the view modes:

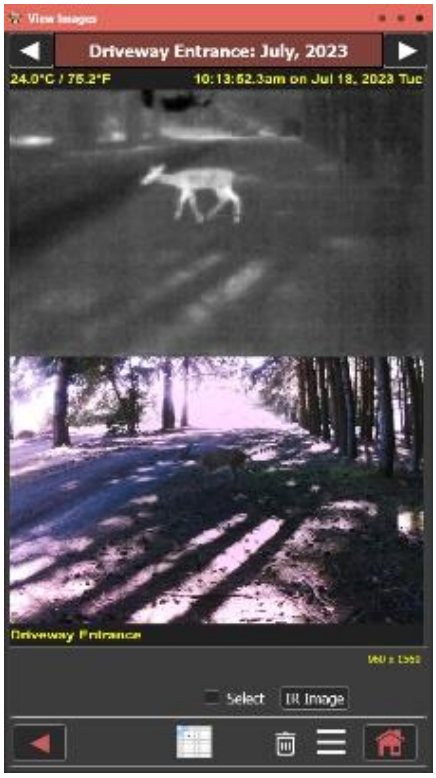
Fusion:



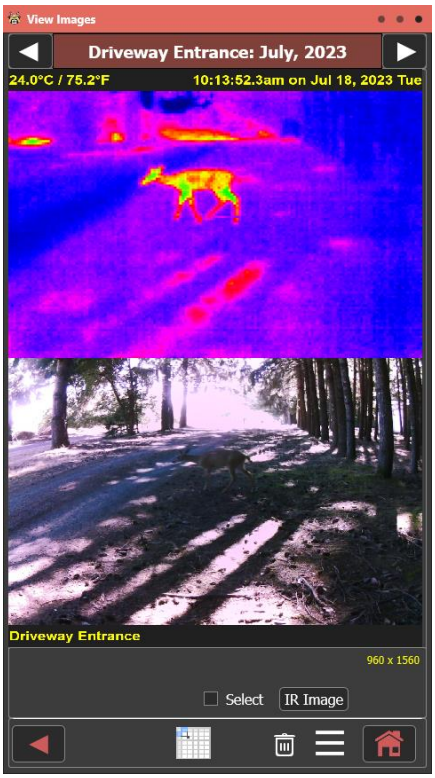
Color Tracker:



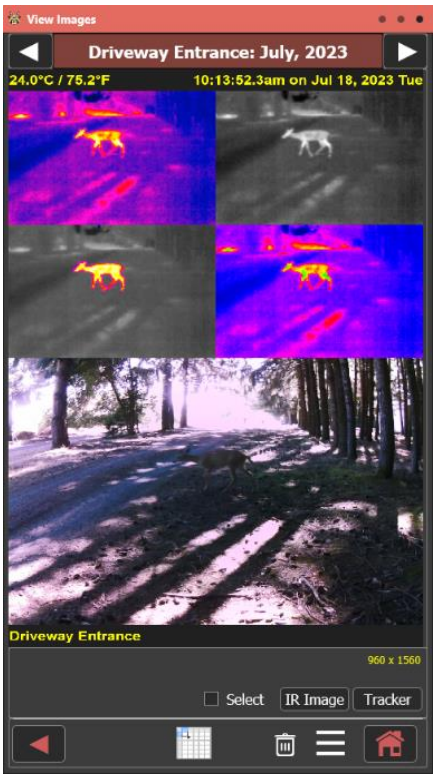
Grayscale:



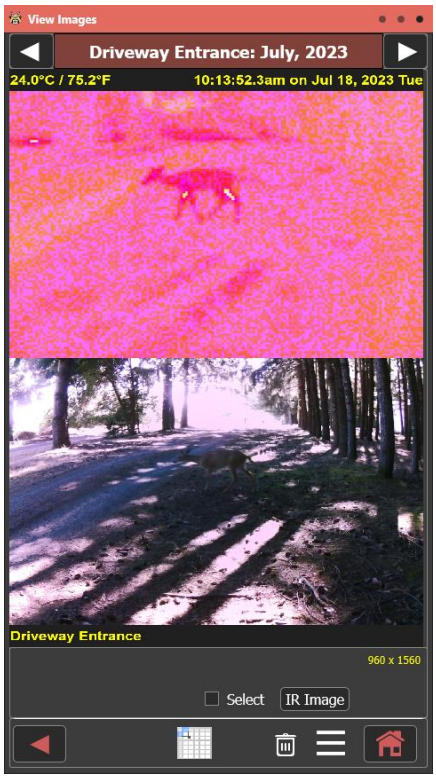
Rainbow:



Quad View:



Raw:



III.d. Camera Configuration

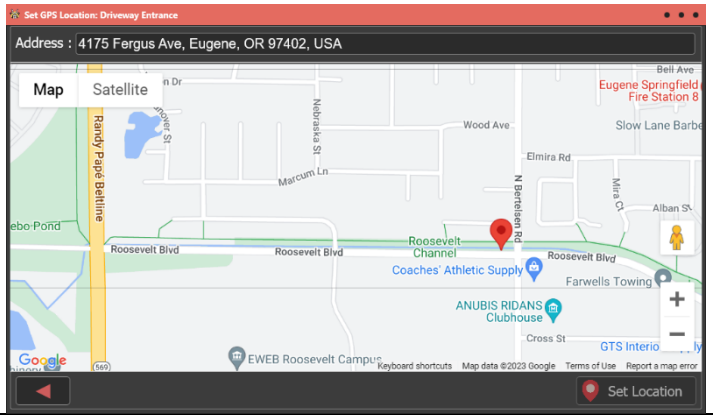
The Ronin Camera is an advanced and highly versatile product with many features and functions. While many users may never want or need to change any of the advanced settings, and the camera is perfectly usable without doing so, some users may find the ability to adjust virtually any aspect of the cameras functioning to be vital to gathering the kind of pictures they wish to capture.

Tapping this icon anywhere will access the **Camera Configuration** screens which starts with the Status page and has 11 total sections for all the different camera settings. To access a specific section, tap the + symbol next to the section to expand it and see the values.

III.d.1. Camera Configuration – Status

The main status page shows the current firmware and hardware version and the Ronin Camera serial number. This information will likely be needed for any customer support needs and it can be found here.

Setting or Function	*Description*
Location	A location description of where the camera is placed (up to 30 characters). This is a key value that is displayed in multiple locations from the Main Link Screen to the alert messages that are sent by email or text message. It is highly recommended to pick a unique and descriptive location name for each camera in the system.
Info 1	Optional secondary information about the camera location.
Info 2	
Owner	Optional name of the camera owner.
Enable Password access	Check this box to require passwords to access the camera. This affects both Live View and Camera Configuration.
Password	Enter in the password you want to use for the camera.
Reset Video and FLIR	Tap this button to force a reset of the FLIR Thermal Imaging camera and the standard Video Camera. This can be useful if you want to revert the cameras back to their default settings, or if you are having any camera issues that may be fixed by resetting them.
Reset All Settings	Tap this button to reset ALL camera settings to the factory default settings. Note that doing this to a connected camera will NOT change any setting required to maintain the camera link. For example, if you are connected by WiFi then resetting the camera does not clear the WiFi link information.

Setting or Function	*Description*
Set GPS Location	The current GPS location for the camera is displayed here. Tap on the Set GPS Location button to display this position on a map and/or to manually set the position using the map or a physical address. When this is tapped a window like this appears:  Type in a new address in the address bar to move the marker, or manually drag it to the desired position. When the marker is on the right spot, tap: Set Location

III.d.2. Camera Configuration – SD Card & Files

The camera has an SD card slot and requires an SD card to be installed for it to operate. The **Files** tab allows you to erase, reformat, and download files from this card using the link to the Sentinel:

There are four types of files on each camera kept in different folders:

New Images and **New Videos**: These are images and Videos that have been captured but not yet sent to the Ronin Sentinel.

Sent Images and **Sent Videos**: These are Images and Videos that HAVE been downloaded or sent to the Sentinel.

Downloading any of the New Images or Videos will automatically move them from the New to Sent folder.

Setting or Function	*Description*
Camera Image and Video Files	New and Sent Video Camera Images and Videos stored on the SD Card.
FLIR Image and Video Files	New and Sent FLIR Images and Videos stored on the SD Card.
(Used Bar)	The progress bar shows how much of the SD card has been used to store images and videos.

Auto Clear old Files	Check this box to automatically erase old files from the SD Card if it becomes necessary to free up space for new Images and Videos.
Erase All Files	Tap this button to erase all the files on the SD Card in all directories. Note that if there are a lot of files it is usually faster to just re-format the card instead.
Re-format SD Card	Reformats the SD Card and prepares it for use. All SD Cards are formatted using the ExFAT file table format which is compatible to the majority of operating systems.

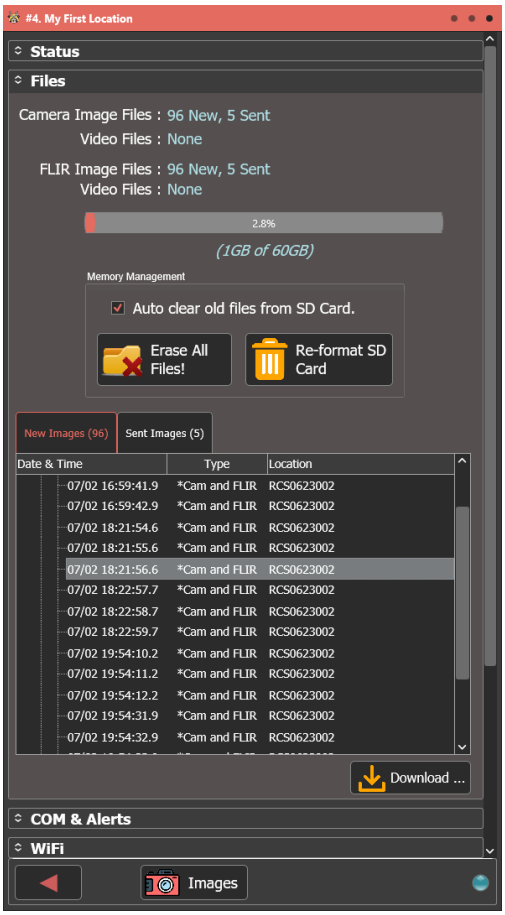
III.d.2.i. View, Select, & Download Files

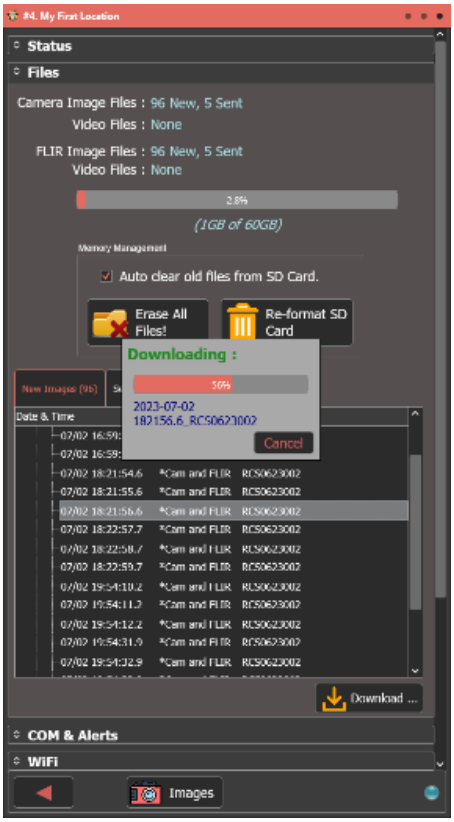
To view, select, and download files from the SD Card start by tapping the tab of the type of file you want access (**New Images or Videos**, or **Sent Images or Videos**) and then follow the steps below:

All files are put into Year and Month groups. Tap on the Year and Month you want to access and a list of available files in that period will be displayed.

The Date & Time of each file along with what type of file it is (usually Cam & FLIR which means both the FLIR Camera and the Video Camera were captured) and the Location when the Image or Video was recorded.

To download a specific file, highlight it and then tap the Download button. A window like this appears:



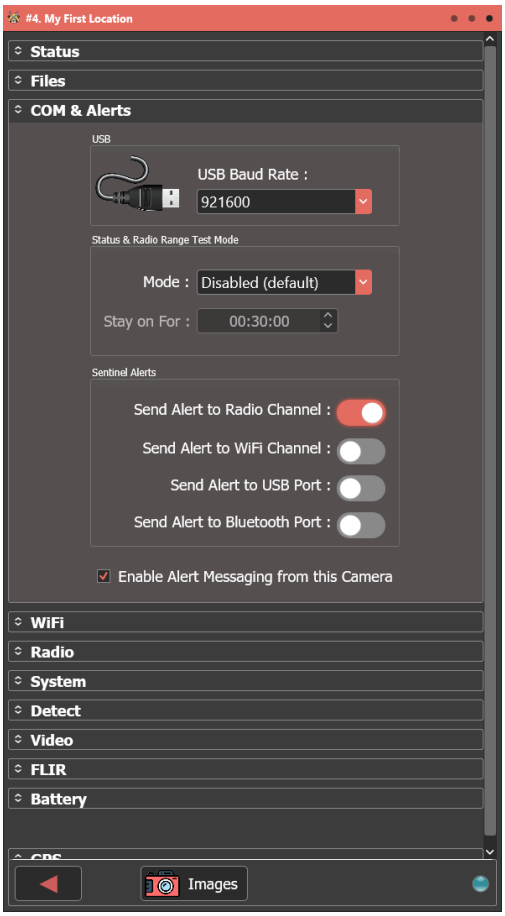


The downloading progress will show how long before the download is complete. When the download finishes, you can tap the Images or Videos button at the bottom of the screen to immediately view it.

Tap Cancel to abort the download at any time.

III.d.3. Camera Configuration – COM and Alerts

This tab controls the communication channel and the alert system from each camera:



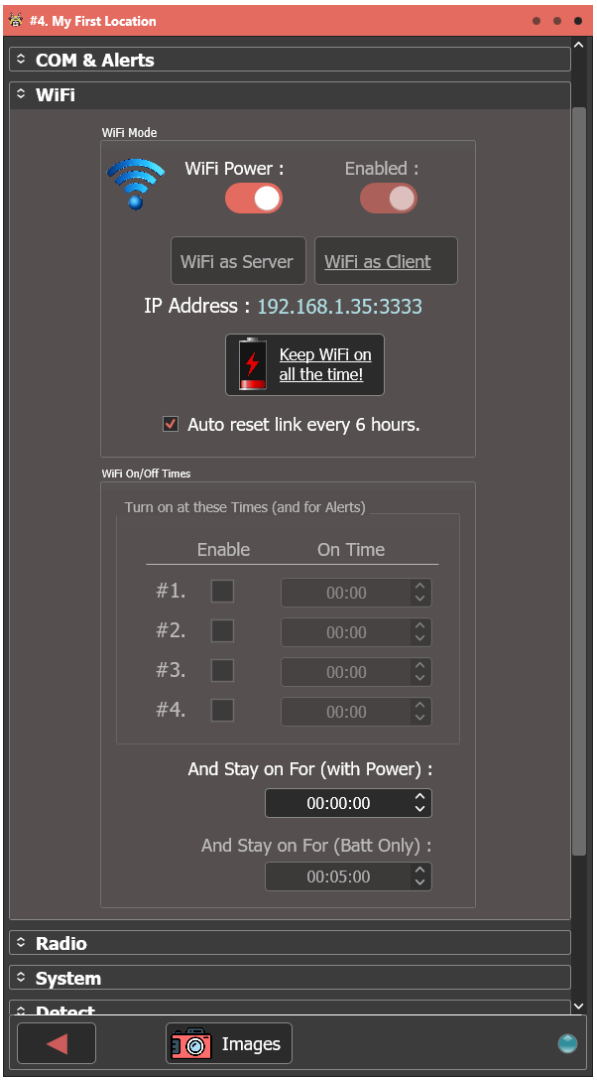
USB Setting	*Description*
USB Baud Rate	The baud rate used by the standard USB connection. Do NOT change this unless you are very aware of how the communication with the camera works.

Status & Radio Range Test	*Description*
Mode	This function is used to do long range testing of the radio signal. Most users will not need to access this ability, but in some circumstances it can be helpful to enable radio range testing. Refer to section **VIII.a. Radio Range Testing** for more information.
Stay On For	If the radio range test mode is enabled this setting determines for how long it will operate once started. See section **VIII.a. Radio Range Testing** for more information.

Sentinel Alerts	*Description*
Send Alert to Radio Channel	Enable the slide switch for each communication channel you want the camera to send a motion alert message to. By default this will be set to the same channel as the Ronin Camera is connected to the Sentinel, however additional channels can be enabled for advanced configurations.
Send Alert to WiFi Channel	
Send Alert to USB Port	
Send Alert to Bluetooth Port	
Enable Alert Messaging from this camera	Check this box to enable the Sentinel to send out Alert Email and Text messages when motion is detected. Unchecking this box turns off this function for this camera only.

II.d.4. Camera Configuration – WiFi

This tab controls the WiFi communication system from the camera. Note that if you are using WiFi to connect to the camera, then not all options will be available to change:

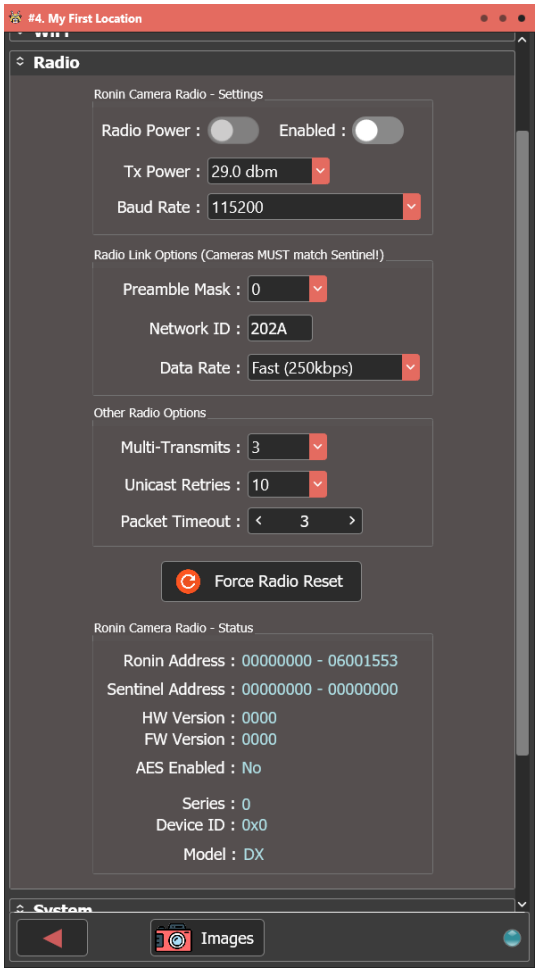


WiFi Mode	*Description*
WiFi Power	Slide switch to Turn On or Off the WiFi power. This is only available if Enabled is set to On.
Enabled	Slide switch to Enable or Disable the WiFi system. This can only be changed if the WiFi power is set to Off.
WiFi As Server / WiFi as Client	Tap this button to switch the WiFi between Server Mode (other devices link to its network) and Client Mode (the camera links to an existing WiFi Network).
IP Address	The IP Address : Port Number that is currently assigned to the WiFi.
Keep WiFi on all the time!	By default the WiFi shuts off after a few minutes (unless it is being used) to save power. Tap this button to force the WiFi to stay on all the time regardless.
Auto reset link every 6 hours	When using the WiFi in Client Mode, checking this box forces it to relink to the network every 6 hours. This is helpful in keeping the link alive when you do not have a lot of activations.

WiFi On/Off Times	*Description*
Turn on at these Times (and for Alerts)	You can specify up to 4 different times to automatically power up the WiFi and have it stay on and listen for a connection request. This is helpful in situations where you want to periodically link to the WiFi while saving power during the off times.
Enabled (#1, #2, #3, #4)	Check this box to enable this specific On time.
And Stay on For (with Power)	When in Small Solar, Large Solar, or Wall Power mode this determines how long the WiFi will stay on for any of the above times. Set it to “00:00:00” to keep it on permanently.
And Stay on For (Batt Only)	When in Battery Only or Batt+FLIR mode this determines how long the WiFi will stay on for any of the above times. Set it to “00:00:00” to keep it on permanently.

III.d.5. Camera Configuration – Radio

This tab controls the radio setup and configuration. If currently using the radio to link to a Sentinel, then not all options can be changed as these would break the link to the Sentinel.



Ronin Camera Radio – Settings	*Description*
Radio power	Slide switch to turn on or off the radio power. This is only available if the Radio is enabled.
Enabled	Enable or disable the Radio module. This can only be changed if the Radio is powered off.
Tx Power	The Transmission power for the radio. You can select: + 21.5 dBm + 27.0 dBm + 29.0 dBm The higher the value the stronger the signal, but the more battery power used. Typically, it is best to start with the highest value and then change it down to a lower value only after checking the signal strength received on the Camera Status View of the Main Link Page.
Baud Rate	Baud rate to communicate between the Radio and the Ronin Camera main processor. Do not change this value unless you receive specific instructions from Diamond Edge.

Ronin Camera Radio - Status	*Description*
Ronin Address	These values describe the current radio version and model inside the Ronin Camera.
Sentinel Address	
HW Version	
FW Version	
AES Enabled	
Series	
Device ID	
Model	

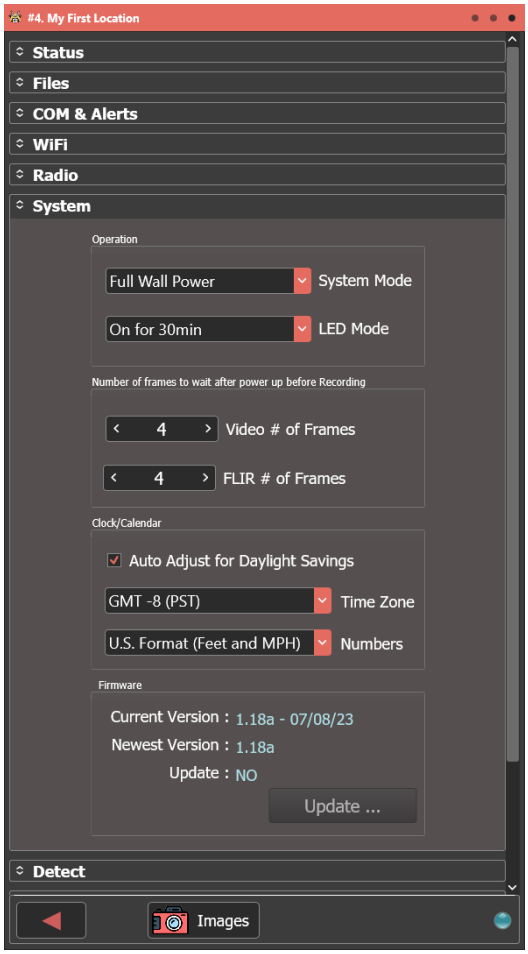
Radio Link Options (must match Sentinel)	*Description*
Preamble mask	The ID in the radio message preamble for this radio network. All radios on the same network must have the same Preamble Mask value.
Network ID	A four hexadecimal digit Network ID value for this radio network (from 0000 to 7FFFF). All radios in the network must have the same ID value.
Data Rate	The speed in which over-the-air communication will run. Like the other values, all radios in the same network must have a matching speed value.

Other Radio Options	*Description*
Multi-Transmits	How many times a broadcast radio packet should be repeated.
Unicast Retries	How many times a non-broadcast radio packet should be retried before giving up.
Packet Timeout	The number of character times of inter-character silence required before transmission begins when operating in Transparent mode.
Force Radio Reset	Tap this button to force a re-initialization of the internal Ronin Camera radio module.

III.d.6. Camera Configuration – System

System values control general camera options as follows:

Operation	*Description*
System Mode	The main system power mode. You can select: + Battery Only + Batt+FLIR + Small Solar + Large Solar + Wall Power See section II.e. for a complete description.
LED Mode	The camera front panel LED's are used to indicate the status of the camera as follows: *Green LED:* + Slowly blinks when camera is on. + Rapidly blinks several times whenever motion is detected. + Turns a steady on (except when motion is detected) if the WiFi links to an existing wireless network or if it is in Server mode and is waiting for other devices to link to it. *Red LED:* + Blinks slowly if the battery is actively charging. + Turns steady on when the battery is fully charged. + The Red and Green LED will flash back and forth in the event of a battery failure. Contact Diamond Edge for how to proceed in this situation. This setting controls how long these LED's will show the above activity as follows: **Always Off:** Keeps the LED's off at all times. **On for WiFi or 30min:** Turns on the Green and Red LED whenever the WiFi link is active or for 30 minutes after powering up. **On for 30min:** Turns on the Green and Red LED for 30 minutes when the unit first powers up or for 30 minutes after pressing the Wakeup pushbutton. **Always On:** Keeps the LED's on at all times.



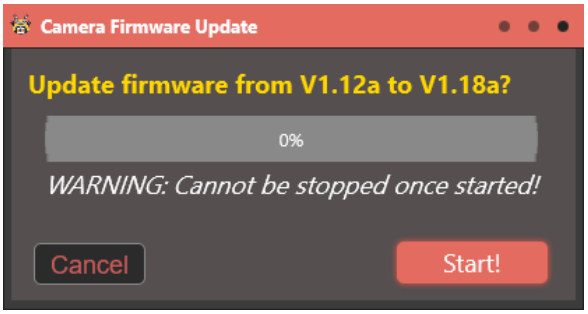
# of Frames to Wait after power up	*Description*
Video # of Frames	These important setting controls how many frames the camera should wait after powering on either the FLIR or Video camera before accepting an image from the camera for capture. The default value of "4" means that it will wait for 4 valid frames before taking the 5th frame as a good image.
FLIR # of Frames	In most situations this is most important at nighttime as it can take the video camera several frames to adjust to the light level being output by the infrared night light. A setting of "4" is a good compromise between trigger speed and image quality. The FLIR camera also can take a while to warmup and produce a good image, and a value of "4" will usually result in a good quality image.

Clock/Calendar	*Description*
Auto Adjust for Daylight Savings	Check this box to automatically adjust the clock/calendar for daylight savings time.
Time Zone	Select the time zone the camera is located in. Setting this correctly is necessary to make the GPS clock time match up to the camera time.
Numbers	Choose between U.S. Format (Feet and MPH) and Metric Format (CM and KPH) for any value that has a difference in these two formats.

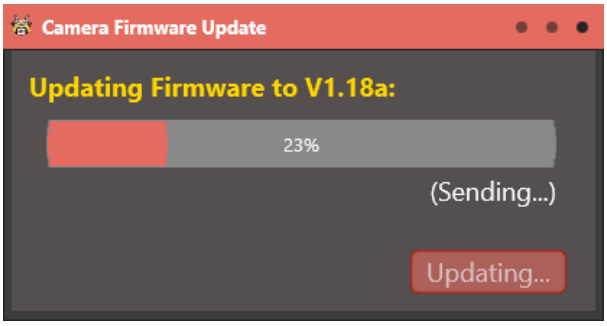
Firmware	*Description*
Current Version	The current firmware version inside the Ronin Camera.
Newest Version	The newest firmware version available on the Ronin Sentinel.
Update & Update **Button**	The "Update" text will say "YES" if an available firmware update for the camera is present on the Ronin Sentinel. This is most likely downloaded automatically when you select "Check For Updates" on the main link screen. When an update is available, tapping the Update button will start the firmware update process. Updates do NOT erase any saved images or videos and in most cases won't change camera setup (unless something is much different in the new firmware version).

III.d.6.i. Camera Configuration – Firmware Update (Windows only)

The app will automatically check for new firmware whenever a camera is connected by. You can also update it at will by tapping the Update button on the System tab when it detects a new version is available. In either case, the first thing that is displayed will be:



Tap Start! to begin the updating. A progress bar will show how it is proceeding:



Once the update completes the app will reset the link to the Camera and attempt to re-connect. This may take a few seconds, after which you will be returned to the Camera Configuration or Add New Camera page.

III.d.7. Camera Configuration – Detect

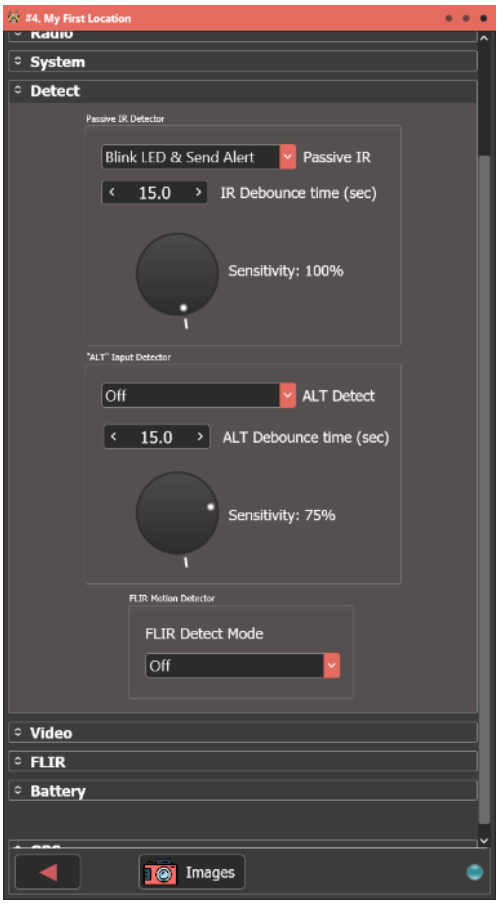
The Detect tab controls the motion detection features of the camera. There are three ways to trigger the camera:

- From the Passive IR Detector
- From the "ALT" Detector Input
- From motion in the FLIR Camera Scene

The Passive IR detector is the black sensor right between the FLIR and Video cameras. It functions in all power modes.

The "ALT" detector input is an electrical input that can be tripped on a pin in the Power Input plug at the bottom of the camera case. This works in all camera power modes. See the Ronin Camera manual for more information on accessing this external trigger input.

Lastly, the FLIR Camera Scene detector works by using the Color Tracker system to find motion in the thermal image scene. This is the most accurate and long distant detector available, but you must be in Small Solar, Large Solar, or Wall Power mode to use it because the camera must constantly scan the FLIR image to detect motion.

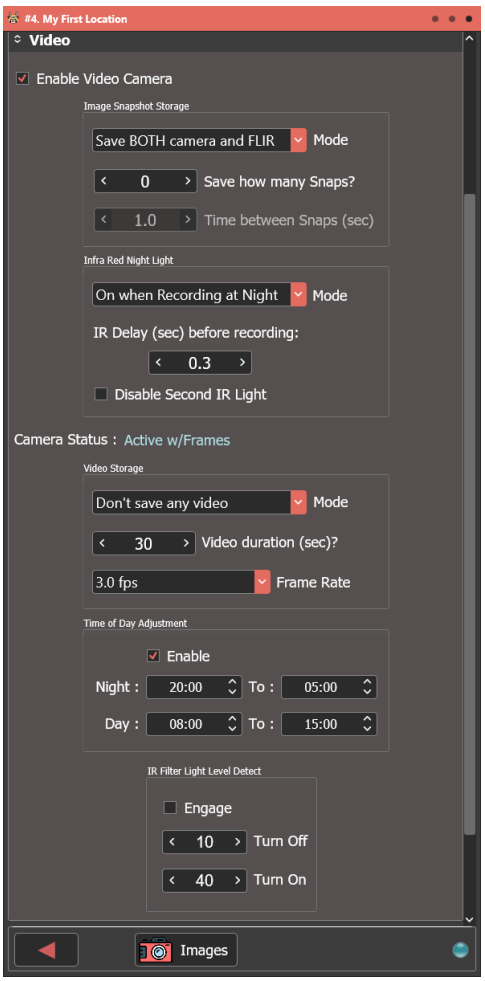


Passive IR Detector	*Description*
Passive IR Detect	You can select between these options: **Off:** Do not use the Passive IR system for detecting motion. **Blink LED Only:** Blink green LED (if it is On) when motion detected, but do not trigger capture. **Blink LED & Send Alert:** Blink the green LED (if it is On) when motion is detected and trigger a full capture with Alert. This is the default mode to use the Passive IR sensor for capture. **Send Alert Only:** Capture the image and send the Alert message but don't blink the LED.
IR Debounce Time (sec)	The minimum length of time the camera will wait from one trigger to the next for capturing new Images or Videos.
Sensitivity	This dial sets the sensitivity of the Passive IR Sensor. A sensitivity of 100% means the slightest twitch on the sensor will set off a capture, and a sensitivity of 0% means it requires many seconds of constant activation to trigger a capture. For most uses, a sensitivity of 93% to 99% is ideal.

"ALT" Input Detector	*Description*
ALT Detect	You can select between these options: **Off:** Do not use the ALT Detect system for detecting motion. **Blink LED Only:** Blink green LED (if it is On) when ALT detected, but do not trigger capture. **Blink LED & Send Alert:** Blink the green LED (if it is On) when ALT Detect triggers and do a full capture with Alert. **Send Alert Only:** Capture the image and send the Alert message but don't blink the LED.
ALT Debounce time (sec)	The minimum length of time the camera will wait from one trigger to the next for capturing new Images or Videos.
Sensitivity	This dial sets the sensitivity of the ALT Detect system. 100% sensitivity means the slightest twitch on the ALT input will set off a capture, and a sensitivity of 0% means it requires many seconds of constant activation to trigger a capture. For most uses, sensitivity of 93% to 99% is ideal.

FLIR Motion Detector	*Description*
FLIR Detect Mode	You can select between these options: **Off:** Do not use the FLIR Camera for detecting motion for triggers. **Blink LED Only:** Blink green LED (if it is On) when motion detected by the FLIR Camera, but do not trigger capture. **Blink LED & Send Alert:** Blink the green LED (if it is On) when the FLIR Camera detects motion and do a full capture with Alert. **Send Alert Only:** Capture the image and send the Alert message but don't blink the LED. **Verify Passive IR Alerts:** Use the FLIR Camera to verify that the Passive IR sensor activation is valid. This mode uses both sensors to verify motion making the system the most reliable and least prone to false trips.

III.d.8. Camera Configuration – Video



The Video tab controls what kind of data is captured when the trigger is detected (Images and/or Videos) and other features such as the infrared Night Light, Time-of-Day Adjustment, and the IR Filter Light Level detection.

It is more common to use the Add New Camera function to set most of these values, but later adjustments can be made here at any time.

General	*Description*
Enable Video Camera	Check this box to enable the Video camera.
Camera Status	Displays the current Video camera status.

Image Snapshot Storage	*Description*
Mode	Selects the mode for Image capture when a trigger is detected as follows: **Don't Save Snapshots:** Disables saving images when a trigger is detected. **Save Just Camera Snapshot:** Enables saving just the image from the video camera. **Save Just FLIR Snapshot:** Enables saving just the image from the FLIR camera. **Save BOTH Camera & FLIR:** Enables saving both the Video and FLIR image when trigger detected.
Save how many Snaps?	If the mode is enabled, then this selects how many images should be captured each time a trigger is detected.
Time between Snaps	This is the length of time between each image capture when more than one image is to be captured for each trigger.

Video Storage	*Description*
Mode	Selects the mode for Video capture when a trigger is detected as follows: **Don't Save any Video:** Disables saving video when a trigger is detected. **Save Just Camera Video:** Enables saving just the video from the regular camera. **Save Just FLIR Video:** Enables saving just the video from the FLIR camera. **Save BOTH Camera & FLIR:** Enables saving both the regular and FLIR video when triggered.
Video Duration	How long of a video should be recorded when a trigger detected.
Frame Rate	The frame rate of the video to be recorded.

Infra Red Night Light	*Description*
Mode	The camera has a high power IR light that is invisible to humans but visible to the regular camera. This light is usually turned on automatically unless you set it below to a different functionality: + Disabled (never turn on this light) + Low Light Only or Turn on at Nighttime (turns on whenever the light level gets low at night) + Auto On or Always On (turns on and stays on, not recommended unless wall power connected and the camera is permanently in the dark!) + On Recording or Turn on When Recording (turns on whenever capturing images or video regardless of light level) + Record+Night or On when Recording at Night (turns on whenever capturing images or video when it is dark) This option should only be changed to "Disabled" or "Record+Night" unless the user has a very good understanding of the power modes and the usage of the camera night light.

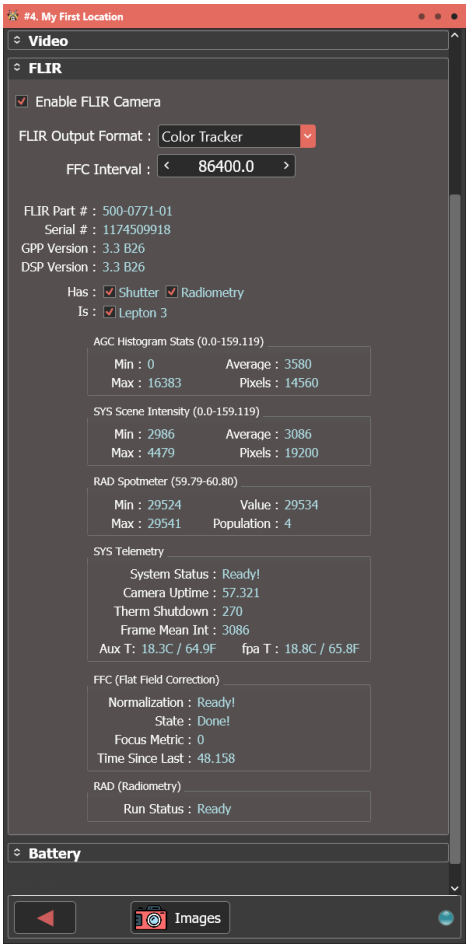
IR Delay (sec) before recording	How long the camera should wait from when it turns on the IR Light to when the Video Camera has adjusted to the new light level available.
Disable Second IR Light	The camera IR Night Light is built as two separate light arrays. Check this box to disable the second array. This will cut the power draw in half, but will reduce the amount of light sent out. If you want to reduce the amount of power or light then this is a handy option to check.

IR Filter Level Detect	*Description*
Engage	Check this box to engage the IR Filter over the camera. Uncheck it to remove the IR filter over the camera lens.
Turn Off	This is the light level reading that triggers an automatic switch from day to night mode. When this level is reached, the camera removes the IR Filter and will turn on the IR LED (if enabled) when it needs to record an image or video.
Turn On	The light level to reverse the process and switch from night to day mode (re-engaging the IR Filter and disabling the IR LED during image or video capture).

Time-of-Day Adjustment	*Description*
Enable	Sometimes car headlights or other external lights can fool the camera into thinking nighttime is actually day time. To prevent this, you can enable the Time-of-Day adjustment and force the camera to consider Night to be from a specific time to a specific time and Day to be a different specific time to specific time. Anytime not within those ranges will be handled by detecting the light level directly from the camera. The advantage to using this feature is that it can force the IR Night Light On even if the camera is being shined on by a car headlight.
Always Night From	
Always Day From	

III.d.9. Camera Configuration – FLIR

This tab displays specific FLIR Camera settings and features. A detailed description of these settings and information is beyond the scope of this manual. However, you can contact Diamond Edge for information and a guide to these functions in greater detail. This information is provided as an aid to understanding the FLIR Thermal image.



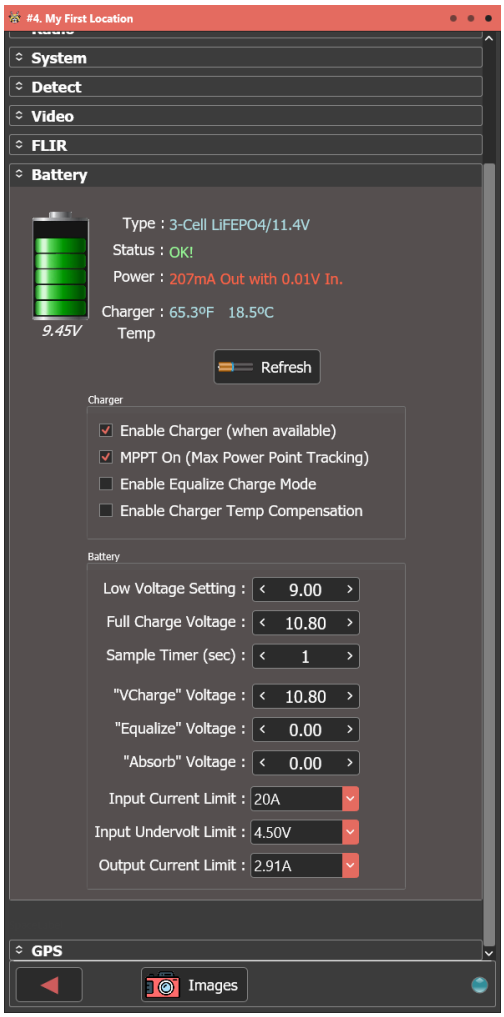
General	*Description*
Enable FLIR Camera	Check this box to enable the FLIR camera.
FLIR Output Format	Selects the mode to display the FLIR thermal image. The default is "Color Tracker", but you can choose from: + Quad Mode + Raw + Fusion Relative + Grayscale + Fusion Absolute + Color Tracker + Rainbow "Quad Mode" splits view into four separate displays of Grayscale, Fusion Absolute, Color Tracker, and Rainbow. See Section III.c.2. IMPORTANT: The Ronin System allows you to change the view mode of any captured image or video after it has been recorded! This means it does not matter what view mode you pick here because you can always change it later using the View Images/Video function. Your choice here only sets the default view mode for the image or video and what format will be used when the image or video is sent to you by an email or text alert. See Section IV and III.c.2. for more information on this ability.

III.d.10. Camera Configuration – Batt

The Batt tab displays the current battery and battery charger information and allows you to control the charger settings.

One of the most useful items is the battery symbol which will be colored according to the current battery voltage level and whether active charging is taking place. This is very useful in verifying that solar panels or wall adapters are functioning properly.

Tapping the Refresh button will update the current battery status information. Repeatedly tapping this button can provide useful information on how the charger and battery system is functioning.



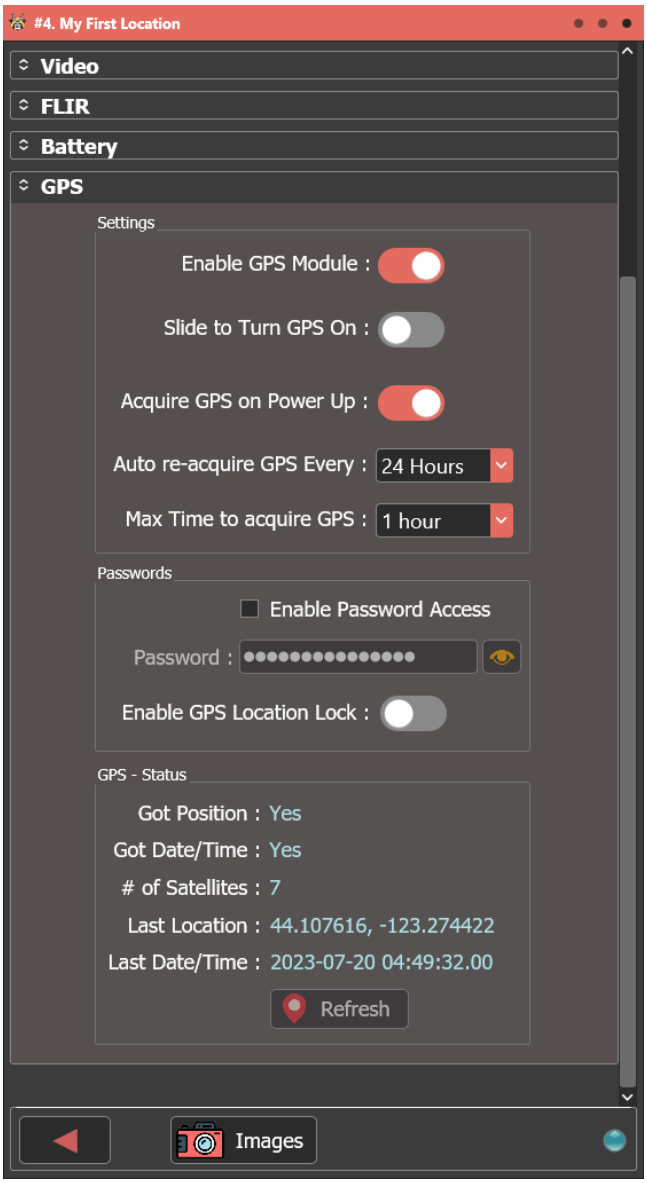
Charger	*Description*
Enable Charger (when available)	Check this box to enable the charger.
MPPT On (Max Power Point Tracking)	MPPT is an advanced charger system for improving the amount of power being used from Solar Panels. Enabling this feature maximizes the efficiency of solar recharging the batteries.
Enable Equalize Charge Mode	When checked the “Equalizer” charge mode is used when the battery charger first starts.
Enable Charger Temp Compensation	When checked the current temperature will be used to adjust charging parameters.

Battery	*Description*
Low Voltage Setting	The battery voltage that is to be considered “low”.
Full Charge Voltage	The battery voltage that is to be considered “fully charged”.
Sample timer (sec)	How often (in seconds) the battery charger system should be checked.
“VCharge” voltage	Controls the final charge voltage regulation servo level. To maintain inherent overcharge protection, only LiFePO4 appropriate charge voltage values can be selected.
“Equalize” voltage	Used to equal out the battery voltage across batteries (not used in LiFEPO4 charging).
“Absorb” voltage	Initial rapid charging voltage level.
Input Current Limit	The maximum amount of current that can be drained from the power input source.
Input Undervolt Limit	The minimum voltage level on the input to shut off the charger system.
Output Current Limit	The maximum output current to feed into the battery pack.

III.d.11. Camera Configuration – GPS

The final tab details the GPS functions and current status. The bottom right box describes the most recent GPS Status and can be updated in real time by tapping the Refresh button.

The remaining options control the various GPS setup and are described below.



GPS - Settings	*Description*
Enable GPS Module	Slide to enable the GPS Module (only can be changed if GPS is off).
Slide to Turn GPS On/Off	Slide to turn on or off the GPS Module (only available is GPS module is enabled).
Get GPS Location on Power Up	Set this to ON if you want the camera to automatically scan for the current GPS location of the camera when it is first powered up.
Auto Re-acquire GPS Every	Select the length of time you want to automatically recheck the GPS location after the first time.
Max Time to acquire GPS	Maximum amount of time camera will wait to get a GPS location before shutting off module.
Minimum Sample Count	The minimum number of GPS location fixes before the position is locked. Increasing this value can improve the accuracy as the GPS chip has a longer time to get a valid location.

Passwords	*Description*
Enable GPS Location Lock	If this is checked the Ronin Camera will save the current GPS location and LOCK it into its memory. When it rescans for the location, or the next time it is powered on, if the location it gets is different than the locked location into the camera it will stop functioning until it receives a password from the user. In effect the GPS Location Lock will "brick" the camera until it receives a password if it moved from its location. This is an anti-theft feature which can help deter anyone who might steal the camera since it becomes useless unless it is returned to its original location.
Password	The password that must be entered to unlock the camera from a GPS location lock.
Always Require a Password	If checked, then passwords are enabled for accessing the camera anytime and not just when it is location locked. Users may want to enable passwords for increased security.

IV. Video and Image Viewer

Built into the app is a complete Image and Video viewer. The app can directly download and save images and videos from cameras (called local files) or get them from the connected Ronin Sentinel. A built in image processor and video player allows you to view, zoom, and share images and videos and you can also easily change the FLIR View Mode of any captured Image or Video (see section III.c.2. for information on FLIR view modes).

Tapping the Images… or Videos… buttons will first display a list of all locations saved on the device or Sentinel and then allow you to select the Year and Month of image you want to see. From there, either a table or a grid of thumbnails displays the pictures and allows you to select one or more of them. Tapping the images or videos icon underneath a camera shown on the main page shows you the most recent image first and then lets you select the month and year for that camera location alone.

IV.a. Differences with and without Sentinel Link

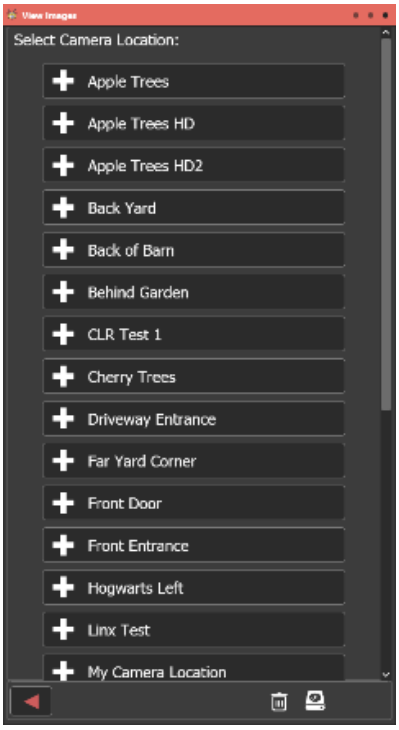
If you are not linked to a Sentinel you can only see the images and videos stored on your device. These are usually just files downloaded to this specific device or files that have been imported using the Import function.

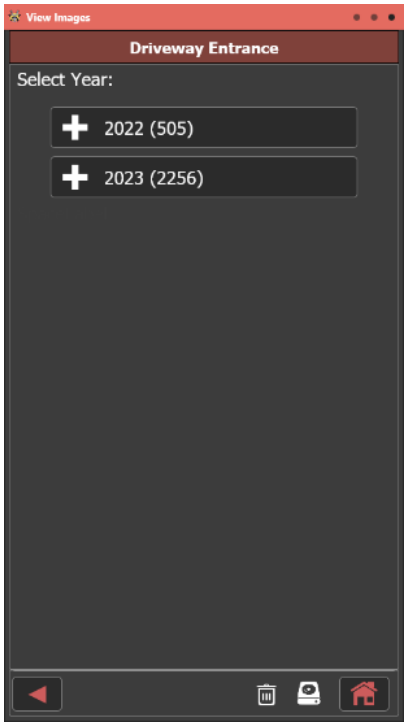
When you are linked to a Sentinel, the app displays all the images and videos that are stored on your device AND on the Sentinel. In addition, a button appears at the bottom of the viewer like this: Tap this icon to switch to local images and videos and the button changes to this: Tap this new icon to switch back to showing both Sentinel and Local images and videos.

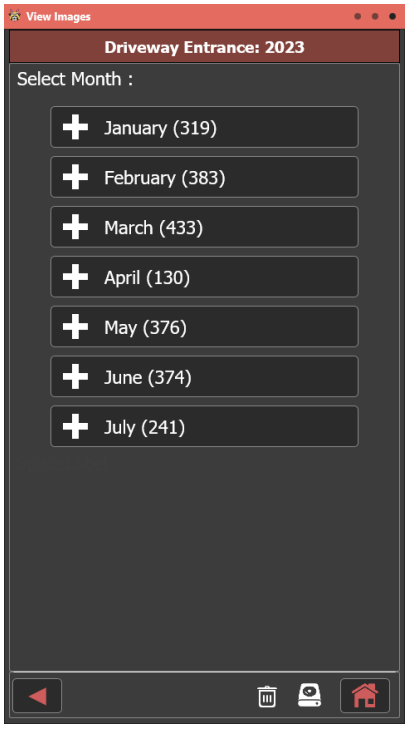
Transferring images from the Sentinel to your device is usually quick and transparent. Transferring videos can take a little longer so the app shows you the progress during the download. See below for more information.

IV.b. Select Location, Year, and Month

When you open the viewer you will be asked for the Location, Year, and then Month of images/videos to view:

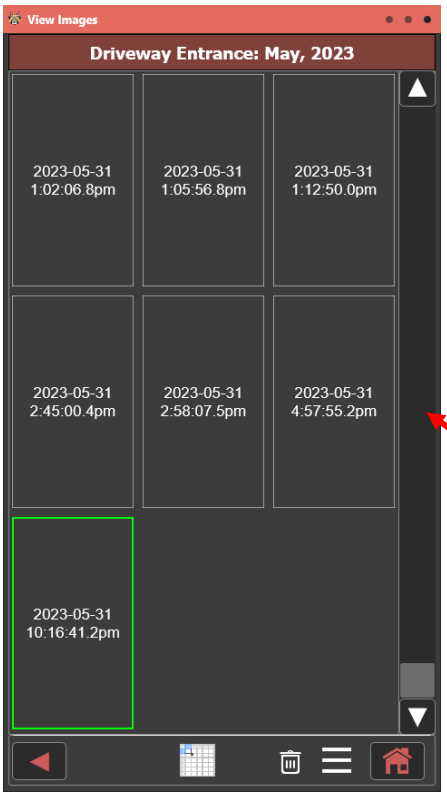




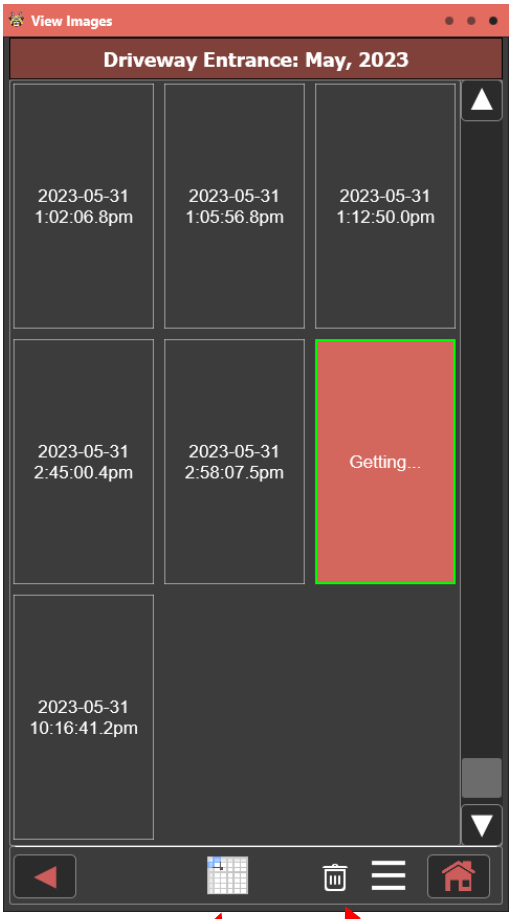


IV.c. Picture Grid

After the location, year, and month is selected the app will show either a thumbnail Picture grid of images/videos or a table listing all the images and videos by date and time.



When first viewing files located on a Sentinel, the picture grid will just show blank boxes with the date and time of the image or video. To download it to your device, tap on the box. The screen will show it is getting the image like this:



Scroll bar to move up and down thumbnail list

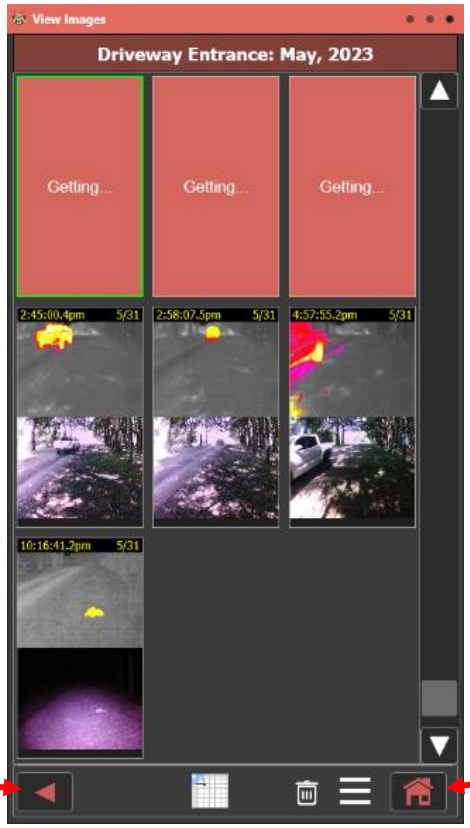
Tap to switch to the table view (see below)

Tap to delete selected image.

You can tap multiple boxes and the app will get more than one image from the camera:

As the image is downloaded a thumbnail will appear showing a smaller version of the image.

To open the image/video viewer, double tap the thumbnail.

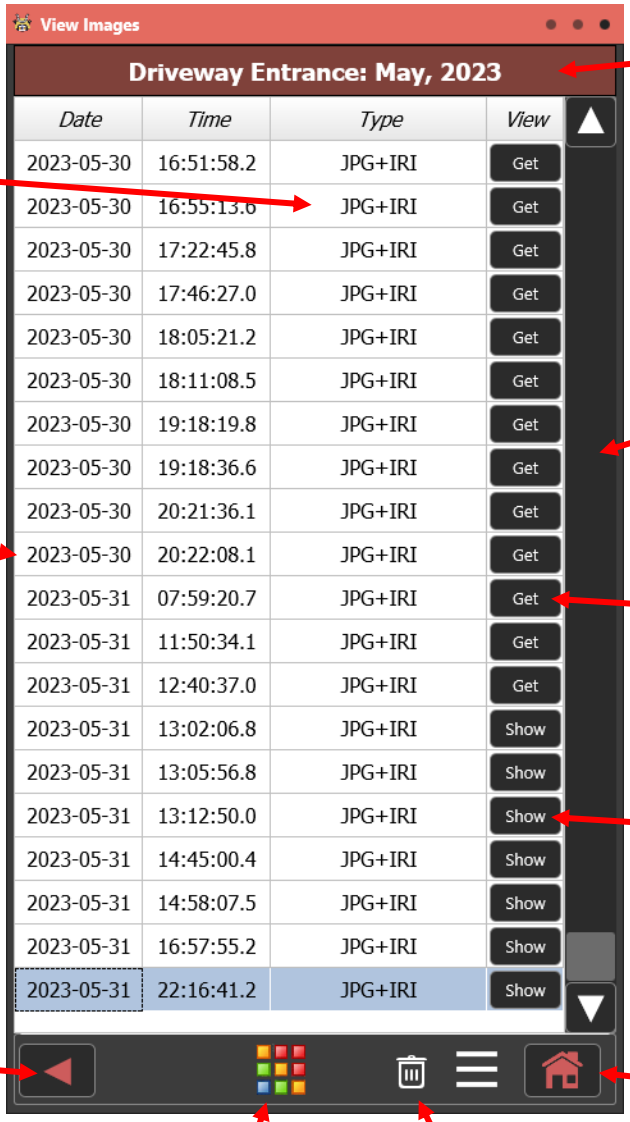


Tap to back up one step

Jump back to the home main link screen

IV.d. Table View

The table view is very similar to the Picture Grid except all the images and videos captured are listed in order in a table that you can select from:



Location, Month, and Year currently listed

Type of file. All camera images and videos are split into the Video Camera and the FLIR Thermal camera. JPG is the storage format for the Video Camera and IRI is the storage format for the FLIR.

This tells you if both types have been found and are available for download.

Scroll bar to move up and down thumbnail list

Date and time of the Image or Video

Get means the file has not been copied to your device, tap it to download.

Show means the file has been copied to your device, tap it to view the image/video.

Tap to back up one step

Jump back to the home main link screen

Switch to the Picture grid view.

Tap to delete selected image or images

Tap the Show button to show the selected image or video. Tap the Get button to download the image or video to your device.

IV.e. Image & Video Viewer

The image viewer shows the selected image or video. Use standard touch gestures or the mouse and mouse wheel to zoom in an out of an image and to pan around.

If you open a Video then an additional play bar appears at the bottom:

IV.e.1. Change FLIR View Mode

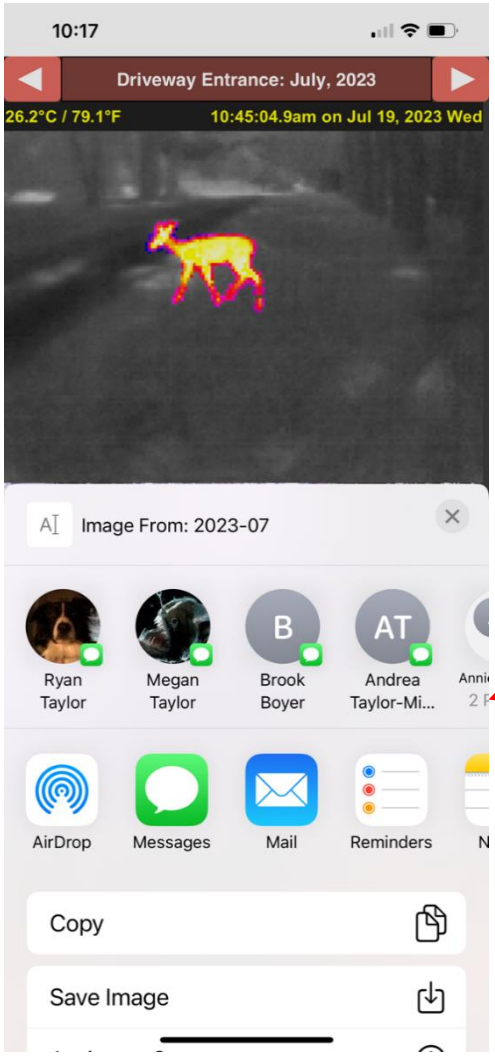
Tapping on the IR Image button opens a window that allows you to change the IR View mode. See section III.c.2. for more information:

IV.e.2. Change Color Tracker

Tapping on the Tracker button allows you to change color tracker options when the display is showing Color Tracker or Quad View. See section III.c. for more information.

IV.f. Share Image or Video (iOS and Android)

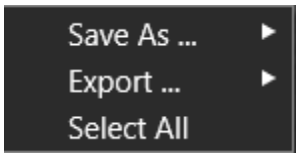
When running the app on iOS or Android an additional button at the bottom appears to allow you to directly share the image or video using the existing technology on the device. Tap the  button that appears at the bottom to open the standard device sharing function that looks something like this:



Refer to your device operations guide for more information on how to use these functions to share the image or video.

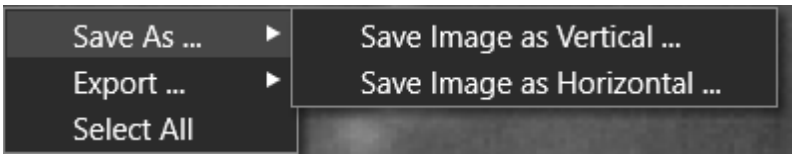
IV.g. Save As Image or Video (Windows and Mac)

On Windows and Mac versions of the app you can right click on any image or video and access the **Save As** function.



Select from **Save As**, **Export**, and **Select All** to select all the images or videos for the current month or year.

Save As allows you to reformat the image or video in either vertical or horizontal format:



As an example, this is the same image in Vertical and Horizontal formats:

VERTICAL:

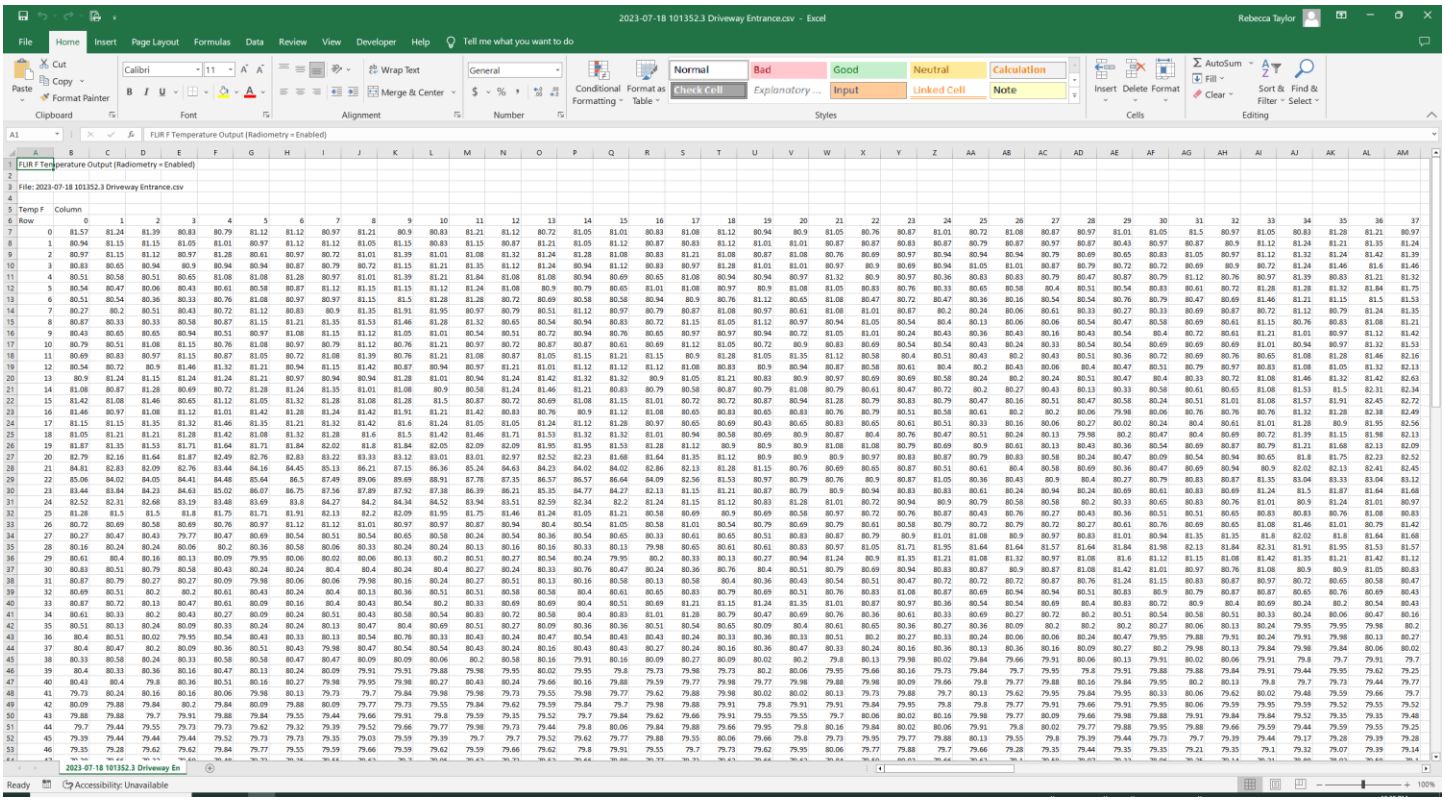
HORIZONTAL:

IV.h. Export Image or Video (Windows and Mac)

Windows and Mac versions of the app also support right clicking on an image or video and selecting the **Export** function:

Select exporting to Fahrenheit, Celsius, or Raw format.

When the export completes a CSV file (coma separated values) will be created and then automatically opened. If Excel is installed on your device it will be opened in that program, otherwise in a text editor. Each column will be a horizontal pixel and each row a vertical pixel.



V. Advanced Topics

V.a. Image and Video File Organization – Ronin Camera SD Card

The Ronin Camera uses an SD card to store all images and videos. This card is formatted using ExFAT and contains the following directories:

Directory	*Description*
NEW	Holds all image and video files that have not been downloaded or sent to a Ronin Sentinel. Once the file is downloaded or sent, it is moved to the SENT directory.
SENT	Holds all the image and video files that HAVE been downloaded or sent to

NEW\IMAGES NEW\VIDEOS	Images and Videos are split into different directories at this point for both NEW and SENT files.
SENT\IMAGES SENT\VIDEOS	

NEW\IMAGES\CAMERA NEW\IMAGES\FLIR	The files are further divided into those from the Video CAMERA and those from the FLIR camera.
NEW\VIDEOS\CAMERA NEW\VIDEOS\FLIR	
SENT\IMAGES\CAMERA SENT\IMAGES\FLIR	
SENT\VIDEOS\CAMERA SENT\VIDEOS\FLIR	

Files from the video camera are standard “JPG” (JPEG) for Images and “AVI” for Video file types which can be immediately opened and viewed using any commonly available software. They will not have the FLIR image attached and will not have any time stamp or other info that the Ronin Sentinel and Ronin Camera Link app add in, but they are usable in their raw form.

Files from the FLIR camera use a proprietary “IRI” format for Images and “IRV” for Videos. This is a custom format developed by Diamond Edge that is supported by our software but is not readable by more commonly available software. The reason for this is that by using our own format we can allow the user to change the FLIR view mode (from Fusion to Color Tracker to Quad View etc) after the image is collected. A standard format would not allow this kind of changeability in the image or video.

When files are brought into the Ronin Sentinel or the Ronin Camera Link App the separate Video Camera and FLIR Camera views are added together and a new file is created that is usable in other software. See the next section for a description of this file organization.

V.b. Image and Video File Organization – Ronin Camera Link App

The app gets images and videos either directly from the camera or from the Ronin Sentinel. It has a different file directory format than the camera uses as described below.

On Android and iOS devices the files are in a sub-directory of the program install and are difficult to access. However, you can tap the share icon to open them more easily and save the combined FLIR and Video Camera images into your camera roll or other location.

On Windows computers it is easier to find the **Images** as follows:

This PC > Pictures : The root folder for the images and videos.

Ronin Cameras (Images) : Images are stored in this folder.

<Location> : Each location will get its own sub-directory.

<year>-<month> : Under the location will be sub-directories for each year and month that has images.

The directory will contain all the JPG (JPEG) files for the combined Video Camera and FLIR Camera captures for this specific year and month and location. These are completely ready to use JPG images that have both cameras, the temperature values, and the Date/Time stamp at the top.

There will also be up to three sub-directories as described below:

Camera : The Video Camera raw files in JPG format.

FLIR : The FLIR Camera raw files in IRI format.

Thumb : Thumbnail files used in the Pictures Grid view.

Videos are also stored in a similar way:

This PC > Pictures : The root folder for the images and videos.

Ronin Cameras (Video) : Videos are stored in this folder.

<Location> : Each location will get its own sub-directory.

<year>-<month> : Under the location will be sub-directories for each year and month that has videos.

The directory will contain all the AVI video files for the combined Video Camera and FLIR Camera captures for this specific year and month and location. These are completely ready to use AVI files that have both cameras in a combined image, the temperature, and the Date/Time stamp at the top. Almost any standard video player can open and play these files.

There will also be up to three sub-directories as described below:

Camera : The Video Camera raw files in AVI format.

FLIR : The FLIR Camera raw files in IRV format.

Thumb : Thumbnail files used in the Pictures Grid view.

Other platforms such as Android and iOS use the same organization but operating system security prevents them from being in a commonly accessible area. Instead, they are stored in a sub-directory of the program app and are saved to common areas only when the share button is tapped.