Range^{IR}

Long Range IR Sensor

Owner's Manual

Revision 1.0

Cognisys, Inc.

Where the left and right brain meet.

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Welcome!

Thanks for purchasing your Range^{IR} from Cognisys, Inc! This state-of-the-art sensor will enable you to capture images that will only be limited by your imagination. With truly ground-breaking technology, this easy to use device can be utilized in many ways – across trails to capture images of nocturnal mammals, near bird feeders to capture shots of birds in flight, next to burrows so the inhabitant will take its own picture. It can also be used along 'flyways' of bats or birds that routinely pass a known spot. It's also a great way of capturing candid shots at parties – as folks walk through a doorway for example. The Range^{IR} has even been successfully employed to capture images of hummingbirds fighting in mid-air!

The Range^{IR} can be used standalone to drive your camera directly, OR via the StopShot to give the photographer even more control and flexibility. The choice is yours.

You have made a wise investment, and here at Cognisys, Inc. we would love to see the images you create with it!

Before you start ~~playing~~ working with the Range^{IR}, ***it is important to spend a few minutes reading this user manual***. It won't take long (honest!), and will ensure you get things right the first time!

1. Safety Instructions

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

Follow all CAUTION notices to reduce the risk of personal injury, prevent damage to the StopShot module, accessories, and devices (cameras, flashes, etc). Failure to follow all CAUTION notices may void your warranty. CAUTION may also indicate a potentially hazardous situation which, if not avoided, may result in personal injury.

The safety alert symbol ⚠ precedes a general CAUTION or WARNING statement.

The electrical hazard symbol ⚡ precedes an electric shock hazard CAUTION or WARNING statement.

2. Getting Started

2.1 Package contents

The latest version of this manual is available at http://www.cognisys-inc.com.

Your Range^{IR} package contains the following:

1. Range^{IR} Infrared Sensor (1)
2. Instruction Manual on CD (1)

Required Accessories:

Shutter Interface Switch, or:
Shutter Cable

Optional Accessories:

Range^{IR} Cross-beam cable (included with purchase of two Range^{IR} sensors)
3.5mm 2m Patch Cable (included with purchase of StopShot)

2.2 Connections

Range^{IR} provides two methods to connect to your camera. You may either connect it to StopShot or operate it in a stand-alone mode.

⚠ **WARNING:** High voltage flashes should NOT be connected to the Range^{IR} or any of its associated adapters/connectors/cables/equipment. Doing so could expose you to dangerously high voltages resulting in serious injury or death.

⚠ **CAUTION:** Do not use "Y" adapters for the camera output to connect more than three devices. Some devices generate significant transients (like solenoids) that may damage sensitive equipment such as cameras and flashes. The Range^{IR} is protected from these transients but other electronics (such as flashes and cameras) may not be. It is acceptable to use a "Y" adapter to connect more than one device to camera output as long as the devices are similar. If you have any questions or concerns about device compatibility, please contact us at: support@cognisys-inc.com.

2.2.1 StopShot Connections

For maximum flexibility it is recommended that the Range^{IR} is connected to StopShot. Connecting the Range^{IR} to StopShot allows you to set up flash recharge times, fire multiple flashes or cameras, kick-off time lapse sequences, perform conditional triggering etc.

To connect the Range^{IR} to StopShot use the included 3.5mm cable. Connect one end to the jack labeled "Sensor" on StopShot and the other end of the cable to the "StopShot" jack on the Range^{IR}.

Your camera equipment would then be attached to StopShot using a shutter interface cable (sold separately).

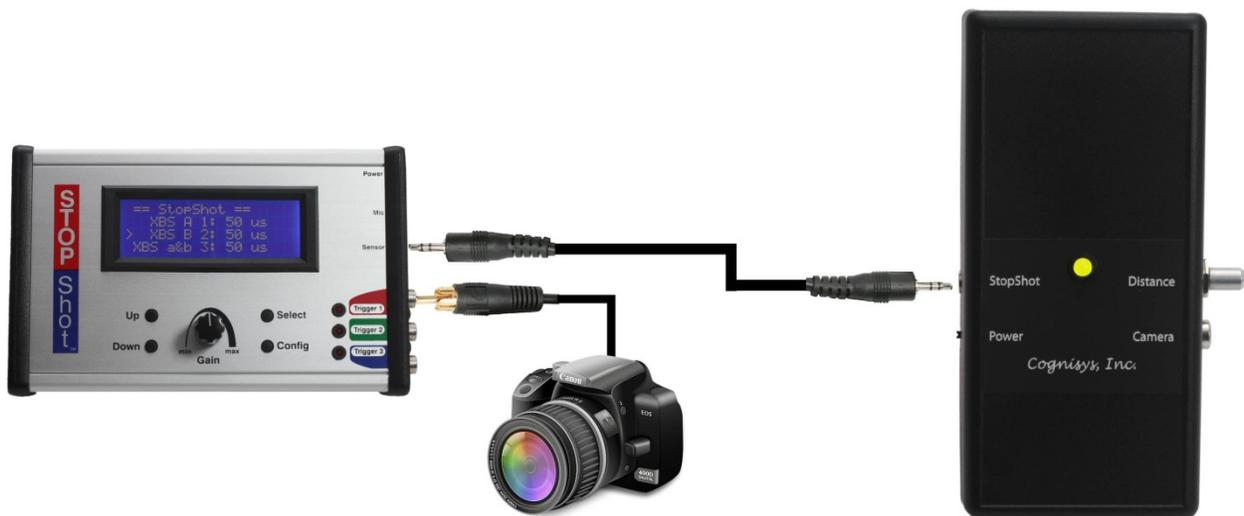See Figure 1 below for a typical StopShot connection diagram.

Figure 1 - Typical Connection Diagram

2.2.2 Stand-Alone Connections

You may also use the Range^{IR} stand-alone directly connected to a camera. This requires a camera shutter cable (sold separately). See Figure 2 below for a typical stand-alone connection.

Figure 2 - Stand Alone Connection Diagram

3. Operation

3.1 Overview

The Range^{IR} requires no cumbersome external reflector so setup literally takes just a few seconds. Simply point the Range^{IR} in the direction you want to detect something! A single knob adjusts how far away the sensor detects a moving object. The bi-color LED illuminates green when the sensor is powered, and changes to red when an object is detected. This corresponds to a trigger event.

The sensor projects an invisible focused beam of infrared light to measure distance (similar to laser range finder triangulation). When an object is detected at a distance equal to or less than the distance you selected using the "Distance" knob the Range^{IR} will trigger the output (either to StopShot or a camera).

If an object stays in the beam path and is within the distance desired, the LED will remain red and the camera or StopShot will not be triggered again until the object moves out of the beam path.

The sensor requires two AA batteries. A fresh set of NiMH batteries will last about 25hrs.

The detection distance is adjusted using the "Distance" knob on the right side of the sensor. Turning the knob clockwise increases the detection distance.

The sensor functions well in direct sunlight. However in bright sunlight or very bright ambient light the detection range will be reduced from what is experienced under very low light conditions. The detection distance may need to be adjusted when the ambient light conditions change significantly.

If the sensor will be used to detect small objects (<1cm across) the travel path should be closer to the sensor -- at least 25cm (one foot) away, but closer than 75cm (3 feet). The sensor can detect objects smaller than 1 cm (0.4") provided they are moving slowly. Larger objects such as birds can be detected over a much larger range.

3.2 Configuring StopShot for use with the Range^{IR} Sensor

StopShot can be configured in either "Trigger" mode or "Cross Beam A" mode when connected to the Range^{IR} sensor.   While the trigger mode will work fine for most applications the "Cross Beam A" mode is recommended. The "Cross Beam A" mode offers some additional noise immunity which will result in less false triggers. Regardless of the mode used the gain knob on StopShot should be set to a minimum when using the Range^{IR} Sensor.

In the setup below we assume that your Range^{IR} sensor and camera are connected to StopShot as shown above in Figure 1. Below we will describe how to configure StopShot to take 3 images each a ½ second apart from each other every time the Range^{IR} detects your subject. In addition we will configure StopShot to wait 10 seconds after each set of images before it will allow another set to be captured.

[NOTE] – To erase all of your StopShot settings and restore StopShot to its default state, hold down the **DOWN** button and plug in the power.

From the main screen of StopShot (shown below) press the **SELECT** button until the cursor is next to the "*trigger*" output you want to change (generally the one the camera is attached to). For our example we will use Trigger 1.

```
      == StopShot ==
>    Trigger 1:  Off
     Trigger 2:  Off
     Trigger 3:  Off
```

Press the **CONFIG** button to get to the output configuration screen.

```
>   T1 Mode:   Trigger
    # Pulse:   1
    TPulse1:   500.0 ms
      Toff1:   100.0 ms        ->
```

This screen enables each trigger output to be configured independently.

Press the **UP/DOWN** buttons until the "*T Mode"* is changed to "*X-Beam A"*.

```
>   T1 Mode:   X-Beam A
    # Pulse:   1
    TPulse1:   500.0 ms
      Toff1:   100.0 ms        ->
```

In this trigger mode you have additional options to modify (if required). Press the **SELECT** button until the ">" indicator is next to the following parameters and use the **UP** or **DOWN** button to adjust the setting.

Pulse:
This option is useful if you would like to fire the flash or camera multiple times for a single trigger. Because we want StopShot to take 3 images each time it receives an event signal from the Range^{IR} we would set the ("*# Pulse"*) to 3. See below:

```
      T1 Mode:   X-Beam A
 >    # Pulse:   3
      TPulse1:   500.0 ms
       Toff1:   100.0 ms          ->
```

TPulse1:

This parameter lets you control how long the output pulse is asserted, or in our example how long the camera shutter button is pressed. This number needs to be long enough for your camera to register a button press. We will not make any changes to this parameter.

Toff1:

This option allows you to control the amount of time in between each output pulse. Continuing on our example above this is the number that controls the amount of time between each photograph. We need to set this number to 500mS (500mS = ½ second).

```
      T1 Mode:   X-Beam A
      # Pulse:   3
      TPulse1:   500.0 ms
 >     Toff1:   500.0 ms          ->
```

Blank:

Additionally, you can adjust *"Blank"*, which is the amount of time that the input is ignored after the output pulses are complete. *"Blank"* is useful for ignoring all but the first of a series of rapidly occurring events. In order to get to the *"Blank"* parameter you will need to scroll through all of the settings for the other pulses. We will not change any of these settings for this setup. To scroll down continue pressing the **SELECT** button until your display matches the display at the bottom with the ">" symbol in front of *"Blank"*. For our example you completed settings will look like this:

```
      T1 Mode:   X-Beam A
      # Pulse:   3
       Pulse1:   500.0 ms
        Toff1:   500.0 ms          ->
```

```
       Pulse2:   Same
        Toff2:   Same
      Pulse3+:   Same
       Toff3+:   Same              ->
```

```
        Incrm:   Off
 >      Blank:   10.0 sec

                                   ->
```

Now there is one final step. We need to go back to the main screen and enable Trigger 1. To get back to the main screen press the **CONFIG** button. You will see this:

```
      == StopShot ==
>      XBS A 1:  Off
     Trigger 2:  Off
     Trigger 3:  Off
```

Now press the **UP** button so you see this:

```
      == StopShot ==
>      XBS A 1:  50uS
     Trigger 2:  Off
     Trigger 3:  Off
```

This will enable Trigger 1 to look for the signal from the Range[IR]. The 50uS is the delay from when StopShot sees the input from the Range[IR] and when it asserts the output. 50uS is 50 microseconds -- this is the fastest StopShot can respond. When using the Range[IR] you will want as little delay as possible.

3.3 Cross-beam configuration

This feature is only available for StopShot users. If you have two Range[IR] sensors you can configure them to operate in cross-beam mode. In this scenario the two sensors will need to be connected to each other. See Figure 3 below for connecting the equipment together. You will need the Range[IR] B-sensor cable to attach the two sensors. This cable should only be used to connect two Range[IR] sensors.

Figure 3 - Cross-beam Connection Diagram

Cross-beam mode opens up virtually endless possibilities for in-flight and trail photography.

Refer to the StopShot manual for more details on configuring StopShot for cross-beam functionality. Below are some basic instructions for each mode.

The following are the possible cross-beam modes:

3.3.1   XBS A/XBS B

In "XBS A" mode, if "Sensor A" detects an object it will trigger StopShot. If "Sensor B" detects something, it won't trigger. In "XBS B" mode, if "Sensor B" detects an object it will trigger. These two modes are useful if you have both sensors deployed and want to switch between which one will currently be used.

3.3.2   XBS A|B

This is "Sensor A or B" mode. If either sensor detects an object it will trigger StopShot. Since the infrared beam-width is narrow on the sensor this mode can be used to increase the chance of triggering if the object is not aligned with one of the sensors.

3.3.3   XBS A&B

Both "Sensor A" and "Sensor B" have to detect an object before triggering. This is a true cross-beam configuration. The sensors would be set at an angle with respect to each other. When something crosses both beams StopShot would trigger the camera. Using this mode decreases the amount of area/distance that an object would be detected. If the sensors were placed at 90 degrees to each other, the space in which StopShot would trigger would only be the beam-width at that distance.
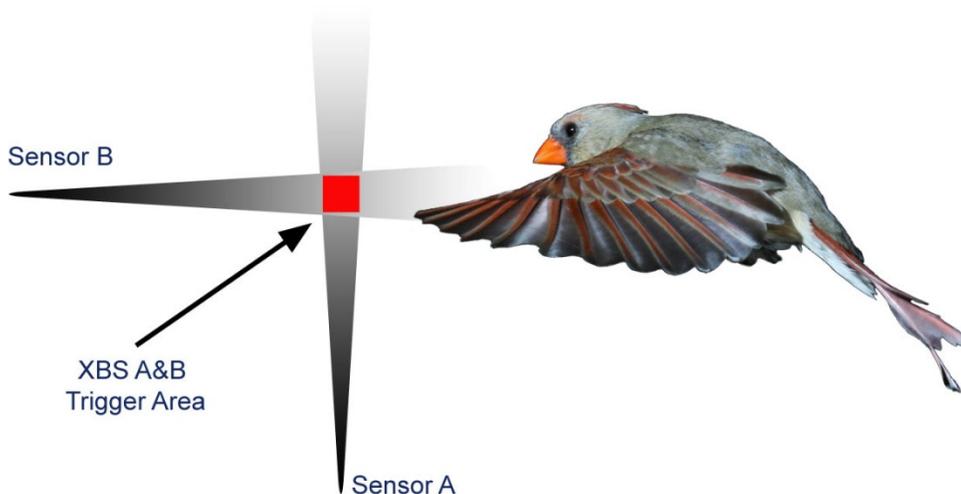
3.3.4   XBS A->B / XBS B->A

Use this mode if you want to trigger on an object only moving in one direction. Two examples:

1. Only capturing a bird entering a nest but not leaving.
2. Deer leaving the feeding area but not entering (great for running/jumping shots).

This mode also has a "timeout" feature which can be used to only trigger on objects that are moving at a fast enough speed. If "Sensor A" detects something but "Sensor B" doesn't within the specified time, StopShot won't trigger (and StopShot re-arms itself).
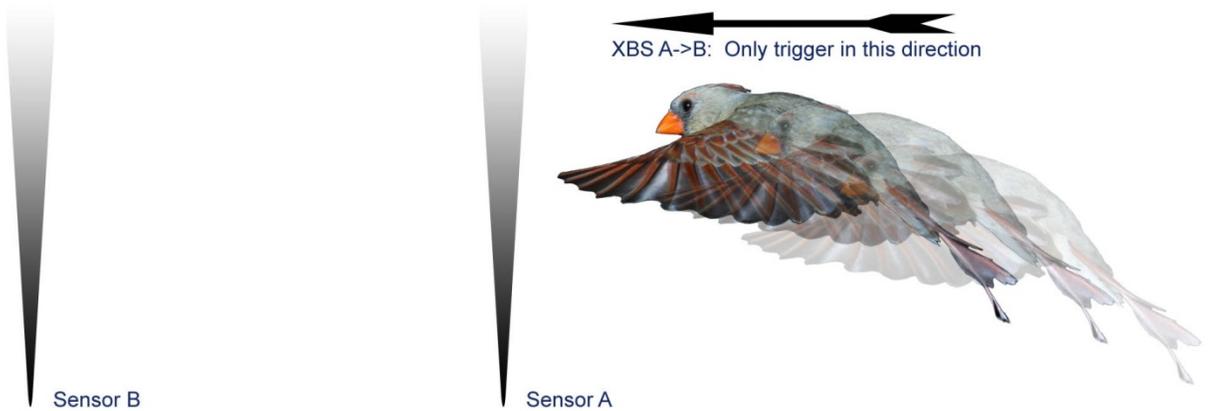
3.4 Stand-alone Use

The Range^{IR} does not require StopShot. With the appropriate shutter interface cable (sold separately) you can use it to directly fire your camera. The sensor will trigger the camera each time it detects an object at the desired distance or closer.

4. Example Setups

4.1 Bird Photography

Birds, like most critters, appreciate free food. One of the easiest ways to take outstanding pictures of birds in flight is to exchange *your* food for *their* pictures. The tricky part is predicting the flight path of the bird to the feeder. The goal is to provide some constraints (a.k.a. nudges) to encourage the birds to follow one path in particular. The easiest way to accomplish this is using a perch. While this may not be effective for all feather gliders, it is a good place to start.

Below in Figure 4 is an example setup outdoors:

Figure 4 - Bird Photography Setup

The perch on the right (currently occupied by a Black-capped Chickadee) is set about three feet away from the bird feeder with the Range^{IR} set in the middle. The Range^{IR} will trigger the camera as birds fly from the perch to the bird feeder. The sensor is mounted vertically in this setup in order to catch birds at all heights on their way to the feeder.

In this shot the Range^{IR} is connected to directly to the camera with a shutter interface switch. In this case the camera controls the flashes via a wireless flash transmitter (Pocket Wizard or the like). Both flashes are controlled by the same wireless flash receiver; it is also common to have flashes connected to the camera via PC cords.

It literally takes longer to replace the batteries in the flashes than to set up the sensor. There are no reflectors, transmitter/receiver pairs, complicated cables, or difficult settings.

Range^{IR} can be used for birds of all sizes ranging from hummingbirds up to turkeys. A turkey in flight? Yes, they can fly. It's not pretty, but they *can* do it!

4.2 Trail Photography

Coming soon!

5. Troubleshooting

Problem	Cause	Solution
Green LED not lit	No batteries	Insert batteries into sensor
	Wrong battery polarity	Make sure the "+" and "-" on the batteries go to the designated "+" and "-" in the battery holder.
	Low batteries	Replace batteries. (NiMH or equivalent is recommended)
	Power switch off	Turn power switch on.
Green LED flashes	Low batteries	Replace batteries.
LED is always red	Distant object is being detected	Turn down the distance knob to decrease the detection range.
	Sensor window is dirty	Gently clean the sensor window with a lightly dampened (NOT wet) soft cloth. Microfiber is recommended.
Camera frequently triggers	Distant object is being detected	Turn down the distance knob to decrease the detection range.
	Object detected	The sensor will activate the shutter each time an object is detected. If using StopShot to trigger the camera, increase the blanking time "Tblank" if less activations are desired.
	Low batteries	Replace batteries.
Poor battery life	Replace with "fresh" batteries of similar age	To prevent damage to the batteries from over-discharging, the sensor has a low battery voltage detector. Old batteries can trip the low voltage safety due to the high pulsed current of this sensor.

If you cannot resolve a problem with your Range^{IR}, please contact us at support@cognisys-inc.com. We want to make sure that you are completely satisfied with our products.

6. Specifications

Specifications are intended for reference only. The design may be modified to improve features or functionality without notice.

Specifications	MIN	NOM	MAX	UNITS
Input Voltage (2 AA batteries)	2	2.4	4	Vdc
Battery life (2 new NiMH AA's)		25		Hours
Output Current Sink	-	-	1	Adc
Detection range	0.25	-	10	m
Detection range	1	-	32.8	Ft
Beam width (approx.) at 100 cm (3.3 ft)	-	4.4	-	cm
Beam width (approx.) at 400 cm (13.1 ft)	-	11.4	-	cm
Response Time	0.1	8.5	17	ms
Max Voltage on Output (Steady State)	-	-	40	Vdc
Operating Temperature	-10	25	60	C
Humidity – Non-condensing	0		85	%
Tripod Mount – ¼-20 on bottom				

This sensor is not waterproof – care should be taken when exposed to rain or snow.

7. Warranty

Limited Warranty

All products are warranted to be free from defects in materials or workmanship for one (1) year from the date of purchase. Within this period, Cognisys Inc. will, at its sole option, repair or replace any components which fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts or labor, provided that the customer shall be responsible for any transportation cost. This warranty does not cover failures due to abuse, misuse, accident or unauthorized alterations or repairs.

THE WARRANTIES AND REMEDIES CONTAINED HEREIN ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESS, IMPLIED OR STATUTORY, INCLUDING ANY LIABILITY ARISING UNDER ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, STATUTORY OR OTHERWISE. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, WHICH MAY VARY FROM STATE TO STATE.

IN NO EVENT SHALL COGNISYS BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE, MISUSE OR INABILITY TO USE THE PRODUCT OR FROM DEFECTS IN THE PRODUCT. SOME STATES DO NOT ALLOW THE EXCLUSION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU.

Cognisys retains the exclusive right to repair or replace the product or offer a full refund of the purchase price at its sole discretion. SUCH REMEDY SHALL BE YOUR SOLE AND EXCLUSIVE REMEDY FOR ANY BREACH OF WARRANTY.

8. Glossary

Term	Description
# Pulse	Number of output pulses that a trigger output will generate.
Blank	The blanking time is the duration where StopShot will ignore the input. This may be useful to ignore second drops, transients, or flashes.
Incrm	Abbreviation for increment. The increment value will be added to the delay setting every time there is an input event.
Independent	A global triggering mode where all the triggers operate independent from each other.
Latched	When an output stays in a given state (on or off).
ms	Abbreviation for milliseconds. A thousandth of a second (1/1000 seconds).
Pwr Off	Power-Off. This lets you choose which trigger output will disable the sensor power. The moment an event is detected the power will be turned off. This is useful for eliminating red laser light from being in pictures. You can choose from no outputs, all of them, or each individual output to cause the disabling of the power.
Pwr Toff	Power Time Off. This is the duration that the sensor power will be disabled.
SEQ	The global configuration is set to "Sequential Mode". This means that the trigger configurations will follow in sequence. The opposite is independent mode where they all function at the same time.
Sequential	A global triggering mode where the triggers operate sequentially. That means that the following trigger won't start until the current one completes.
Short Circuit (short)	To connect two wires together. Provide a path for current to flow with low resistance.
TMode	Trigger Mode. This is a global configuration that lets you choose the behavior of StopShot. Examples are: Independent, Sequential, Time Lapse, Flash measurement, etc...
Toff	The time off between output pulses.
Trigger	When one of the three channels is configured as "Trigger", it will fire the output after a configurable delay after seeing an input.
Trigger Output	One of the three outputs of StopShot. The Red LED's correspond to the three outputs.
us	Abbreviation for microseconds. A millionth of a second.

9. Revision History

Revision	Date	Change
1.0	01/11/12	Initial Release