Security Camera

Plugin for Indigo to view and control security cameras

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Security Camera Overview

https://github.com/bkmar1192/SecurityCamera/

This plugin is designed to be used for security cameras that provide access to a refreshing image file. The refreshing image file can then be used on control pages.

1. Capture images from an ip based security camera.
    a. Rotate image orientation.
    b. Set image size (retains original image dimensions).
    c. Adjust image quality (contrast, brightness, sharpness).
    d. Change the jpeg image quality.

2. Record video clips.
    a. Save a 30 second recording of a triggered camera.
    b. Replay clips to a refreshing image file for display on a control page.

3. Detect motion of a camera, usable as a trigger for other actions.

4. Capture still images.
    a. Capture a single snap shot for a particular camera.
    b. Capture a mosaic image showing the last six captured images on a camera.

5. Ability to capture images from a local file versus a remote camera.

> *Note*: Security Camera will only work with cameras that provide access to a refreshing still image file. It will not work with video files.

Files

The Security Camera plugin creates several different files that can be used on control pages. Many of these images are manipulated through running different actions.

The following directories start in the base directory setup during the plugin configuration.

/Camera Name/CurrentImage.jpg: current refreshing image. Add to control pages as a refreshing image.

/Camera Name/thumb[01 - 10].jpg: Thumbnail images for each of the 10 recordings.

/Camera Name/NotActive.jpg: Default image when a camera is off or unavailable.

/Master1.jpg: An image that will show either the most recent selected master image or the last selected recording. This is changed through the play recording action and the master image action.

/Master2.jpg: An image that will show the most recent selected master image. This is changed through the master image action.

/Master3.jpg: An image that will show the last selected recording. This is changed through the play recording action.

/Master4.jpg: Same as Master1.jpg but can be toggled between a low and high resolution image.

/CarouselImage.jpg: An image that rotates through each of the cameras, switching every 3 seconds.

/CarouselImageLR.jpg: Low resolution version of the carousel

The following directories start in the Snapshot directory setup during the plugin configuration.

/0000[1-9].jpg: Includes the last 9 snapshot images taken via the snapshot action, regardless of which camera is used. Snapshots are saved via the Snapshot action.

/mosaic.jpg: The most recent mosaic image, regardless of the camera used. The mosaic is a 2 by 3 grade of the the six most recent images captured from the camera. Mosaics are saved via the Mosaic action.

Initial Setup

Installation

Security Camera requires the Python Image Library module to be installed (Pillow). This module is not included in the base install of Python and must be manually installed.

To install, run the following from the terminal:

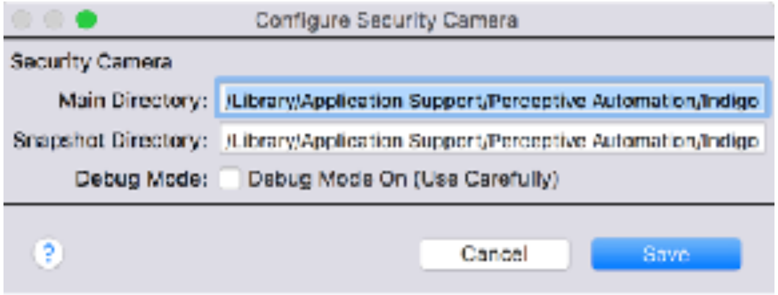
```
sudo pip install Pillow
```

If you have issues with the above command you may need to run:

```
sudo -H pip install Pillow
```

Once Pillow is installed, download the Security Camera plugin found here: https://github.com/bkmar1192/SecurityCamera/. Then follow the instructions for installing a plugin in Indigo.

Plugin Configuration



Security Camera

Main Directory: /Library/Application Support/Perceptive Automation/Indigo

Snapshot Directory: /Library/Application Support/Perceptive Automation/Indigo

Debug Mode: □ Debug Mode On (Use Carefully)

Main Directory: This is the base directory where all files will be saved. A directory for each camera (device) will be created in this directory. You can leave this at the default location unless you want to store them somewhere else.

> *Default Main Directory*: /Library/Application Support/Perceptive Automation/Indigo 7/IndigoWebServer/video

Snapshot Directory: This is the directory where snapshots and mosaics are stored (described in Actions section). You can leave this at the default location unless you want to store them somewhere else.

> *Default Snapshot Directory*: /Library/Application Support/Perceptive Automation/Indigo 7/IndigoWebServer/video/Snapshots

Debug: This will turn on more detailed debugging information. Turning this on will add a lot of messages to your log file so use it sparingly.

Updating:

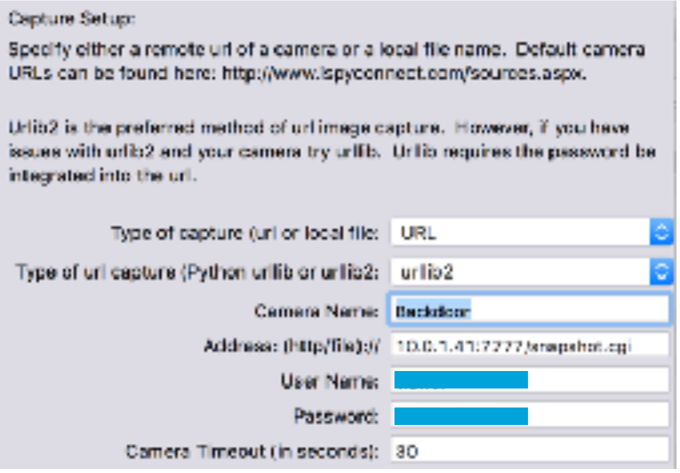
The Security Camera plugin is stored on GitHub and can be updated through the plugin menu items listed below.

Check for Updates: Checks for new versions of the Security Camera plugin on GitHub.

Update: Updates the plugin to the most recent version.

Device Configuration

Main Setup: URL



Capture Setup:

Specify either a remote url of a camera or a local file name. Default camera URLs can be found here: http://www.ispyconnect.com/sources.aspx.

Urlib2 is the preferred method of url image capture. However, if you have issues with urlib2 and your camera try urllib. Urllib requires the password be integrated into the url.

Type of capture (url or local file: URL

Type of url capture (Python urllib or urllib2: urllib2

Camera Name: Backdoor

Address: (http/file)://: 10.0.1.41:7777/snapshot.cgi

User Name: [redacted]

Password: [redacted]

Camera Timeout (in seconds): 30

Type of Capture: Select URL to capture an image from a web page created by the ip camera.

Type of URL Capture: Specify to either use urllib or urllib2 for capturing images. Urllib requires that the username and password for the camera be specified in the url. See below for determining the format for your specific camera. Urllib2 will display fields for user name and password. Do not include the username and password in the url.

> *Note*: Urllib2 performs better than urllib at recovering cameras that go off-line and is the preferred captured method. Urllib is included for compatibility with early versions of Security Camera and if the username/password of urllib2 does not work.

Camera Name: Enter a unique name of the camera. This name will be used to create a directory in the base directory. All images and recording for the camera will be stored in this directory.

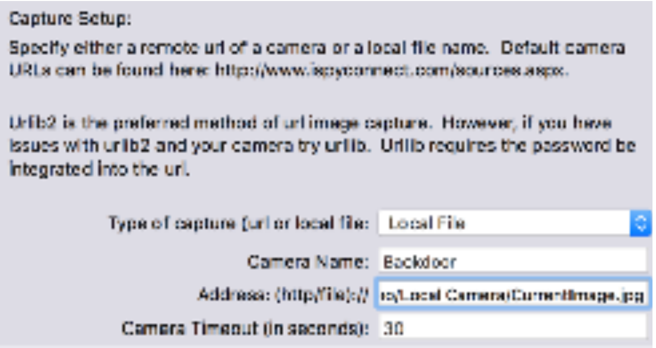
Address: Enter the URL that displays a refreshing image of the actual camera that is being accessed. Include just the URL, do not include the http://.

> *Note*: Security Camera only works with cameras that provide a url of a refreshing image. Information a a wide variety of cameras can be found at *http://www.ispyconnect.com/sources.aspx.* 1. Find your camera brand and click on the

link. 2. Look for the camera model with Type equal to JPEG. 3. Click on the model name. 4. A dialog will pop up that will guide you through creating the url.

Camera Timeout (in seconds): Specify the number of seconds of no new images from the ip camera before it triggers a timeout. Security Camera attempts to capture a new image every second. However, some older ip cameras may not respond quickly enough which may trigger an "offline" state. Increase this number if a ip camera goes off line regularly.

Main Setup: File



Capture Setup:

Specify either a remote url of a camera or a local file name. Default camera URLs can be found here: http://www.ispyconnect.com/sources.aspx.

Urllib2 is the preferred method of url image capture. However, if you have issues with urllib2 and your camera try urllib. Urllib requires the password be integrated into the url.

Type of capture (url or local file: Local File

Camera Name: Backdoor

Address: (http/file)://: es/Local Camera/CurrentImage.jpg

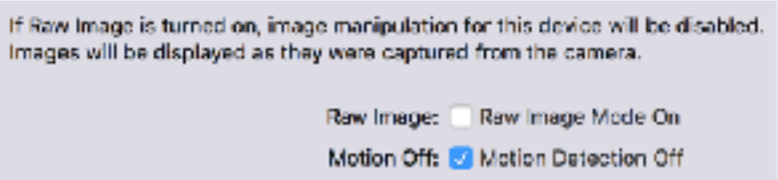
Camera Timeout (in seconds): 30

Type of Capture: Select Local File to capture an image from a local directory. This can be used for cameras that can post a file to a local directory (i.e. via FTP) or other capture tools that save files locally.

Address: Local directory and filename of local image.

Camera Timeout (in seconds): Specify the number of seconds of no new images from the directory before it triggers a timeout.

Device Configuration:



If Raw Image is turned on, image manipulation for this device will be disabled. Images will be displayed as they were captured from the camera.

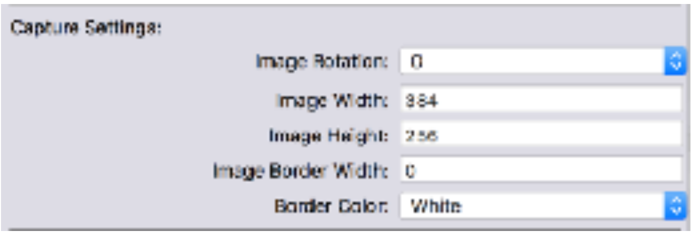
Raw Image: □ Raw Image Mode On

Motion Off: ☑ Motion Detection Off

Raw Image: Do not apply any image manipulation to the file (rotation, sizing, adjustments, etc). This is primarily used for testing purposes and can be left unchecked in almost all cases.

Motion Off: Check this box to turn off motion checking on a camera. Motion detection runs in a separate thread from the image capture so it can have some minor performance impact (see CPU usage in the Appendix for details). Turn this off to reduce CPU impact of the plugin.

Capture Settings



Capture Settings:

Image Rotation: 0

Image Width: 384

Image Height: 256

Image Border Width: 0

Border Color: White

Image Rotation: Rotates the image if your camera is upside down or sideways.

Image width and height: Set the pixel width and height of the final image. For best results this should be the same as the image size used on the control page. The original dimensions of the image will be retained by adding a black bar to either the top/bottom or left/right of the final image.

Image border width: Enter a number from 1 to 100 to add a border around the image.

Border Color: Specify a color for the border. Available colors are Grey, Black, White, Blue, Red, Green, Yellow, or Purple.

Image Settings

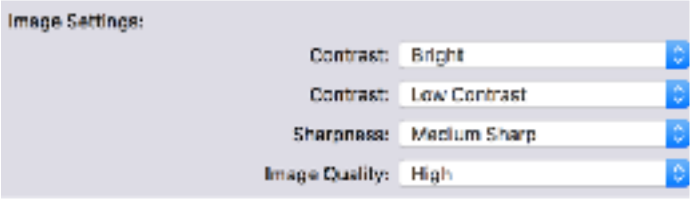


Image Settings:

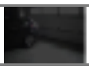
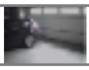
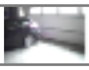
Contrast: Bright

Contrast: Low Contrast

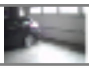
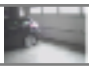
Sharpness: Medium Sharp

Image Quality: High

Brightness: Set the brightness of the final image.

Very Dark	Dark	Original	Bright	Very Bright
				

Contrast: Set the contrast of the final image.

Very High Contrast	High Contrast	Original	Low Contrast	Very Low Contrast
				

Sharpness: Set the sharpness of the final image.

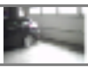
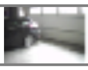
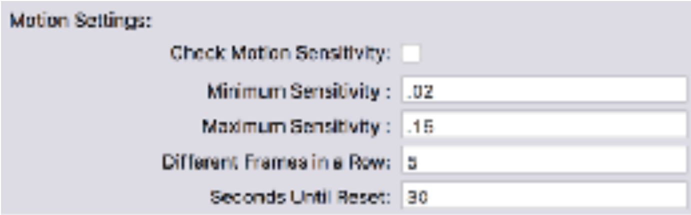
Original	Very Low Sharpness	Low Sharpness	High Sharpness	Very High Sharpness
				

Image Quality: The level of the image compression used on the final file.

Original	High	Medium	Low
92kb	18kb	12kb	9kb

Motion Detection:



Motion Settings:

Check Motion Sensitivity: □

Minimum Sensitivity : .02

Maximum Sensitivity : .15

Different Frames in a Row: 5

Seconds Until Reset: 30

Motion detection works by percent of pixels different between the current image and the previous image. This percent is then subtracted from the average of previous comparison.

> *For Example*: If the average percent of different pixels is 2% (.02) the current image has a 15% (.15) difference, the motion detection would be 13% (.13).

If the difference is between the minimum and maximum sensitivity settings, the plugin registers a different frame. If the number of different frames in a row becomes greater than *Different Frames in a Row* setting, then the *MotionDetected* state is set to **true**.

After x seconds (as determined by the Seconds Until Reset setting) the MotionDetected is set to false.

Check Motion Sensitivity: Shows the percent pixel difference between the current image and previous image on the image. This can be used to assist with setting the sensitivity minimum and maximum.

Max/Minimum: Maximum and minimum sensitivity sets how much image change is required before motion is detected. Enter numbers in decimal numbers versus a percentage. (e.g. enter .02 and not 2%).

Different Frames in Row: Specify how many frames in a row need to be different to trigger motion.

> **Example**: A car driving past a camera registers 3 frame changes in a row. While a car entering the driveway registers 5 or more different frames. Set the *Different Frames in a Row* to 6 to ignore passing cars but capture cars pulling up to the house.

Seconds Until Reset: Enter the number of seconds between registration of motion.

Actions

Stop Camera: Stop capturing images from the camera. The camera state will nbc set to off and the offline image will be displayed.

Start Camera: Start capturing images from the camera.

Toggle: Turn the camera from off to on and from on to off.

Master Camera: Switch the Master image to the specified camera (see details in the file section). This can be used to have a single image on a control page that changes to different cameras based on action or clicking on a link. This action updates *Master Image 1* and *Master Image 2*.

Toggle Resolution: Switches from a low resolution image to a high resolution image. Only works with MasterImage4.jpg. Does not change recording resolution.

Record: Save the last 30 seconds of images from the camera. Up to 10 videos per camera can be played back through the *Play* action. However, an unlimited number of records can be captured and saved.

Play: Play back one of the last 10 recorded videos for a specific camera. Specify the camera and the recording 1 - 10 in the action configuration. This actions updates *Master Image 1* and *Master Image 3*.

> *Note:* Each recoding has an associated state that specifies if the recording has been previously played. This can be used in control pages to flag new recordings.

Pause Recording: Pause the advancement of the currently playing recording.

Frame Forward: Advance the recording forward one frame.

Frame Backward: Advance the recording backward one frame.

Take Snapshot: Saves the current image to series of files in the snapshot directory. Specify the resolution (Original, High, Medium, Low) in the action configuration.
Saves images as *0000[1-9].jpg*. 1 is the most recent, 2 becomes 3, 3 becomes 4, etc.

Take Mosaic: Saves current image to the *mosaic.jpg* in the snapshot directory. Saves only a single image at a time, saving over previous file.

Toggle Carousel: Start/stop the rotation of the carousel cameras.

Toggle Carousel Loop: Start/Stop the auto advance to next camera.

Next Carousel Camera: Manually advance to the next camera.

Camera Command: Executes a URL command. Several cameras can be changed by issuing url commands (rotate, zoom, etc). Check online and in manuals for specific commands.

Delete Old Files: Recordings older than the days specified will be moved to an archive folder. Use this action with a scheduled action to archive old files. Files will not be deleted so files must be manually deleted.

States

CameraState (on/off): State of the camera as determined by the actions: Stop Camera, Start Camera, and Toggle Camera. Will show Unavailable if no picture has been captured in the last x seconds (determined by the Timeout setting on the camera device).

FrameDiff: Number of frames in a row that have detected motion.

ImageAveDiff: The average difference between the current and previous image frames.

MotionDetected: Set to true when FrameDiff is greater than the *Different Frames in Row* setting. Sets to false once the *Seconds Until Reset* has expired.

MotionSeconds: Number of seconds since last motion was detected.

Offline Seconds: Number of seconds an image has not been captured from the camera.

PixelDiff: Percent of different pixels detected between the current frame and the previous frame. This can be used to monitor pixel changes to adjust motion sensitivity.

RecordSeconds: Number of seconds since the last recording. When using triggers (i.e. motion sensors) to capture recordings, use RecordSeconds to limit the number of recordings by not creating another recording for a period of time.

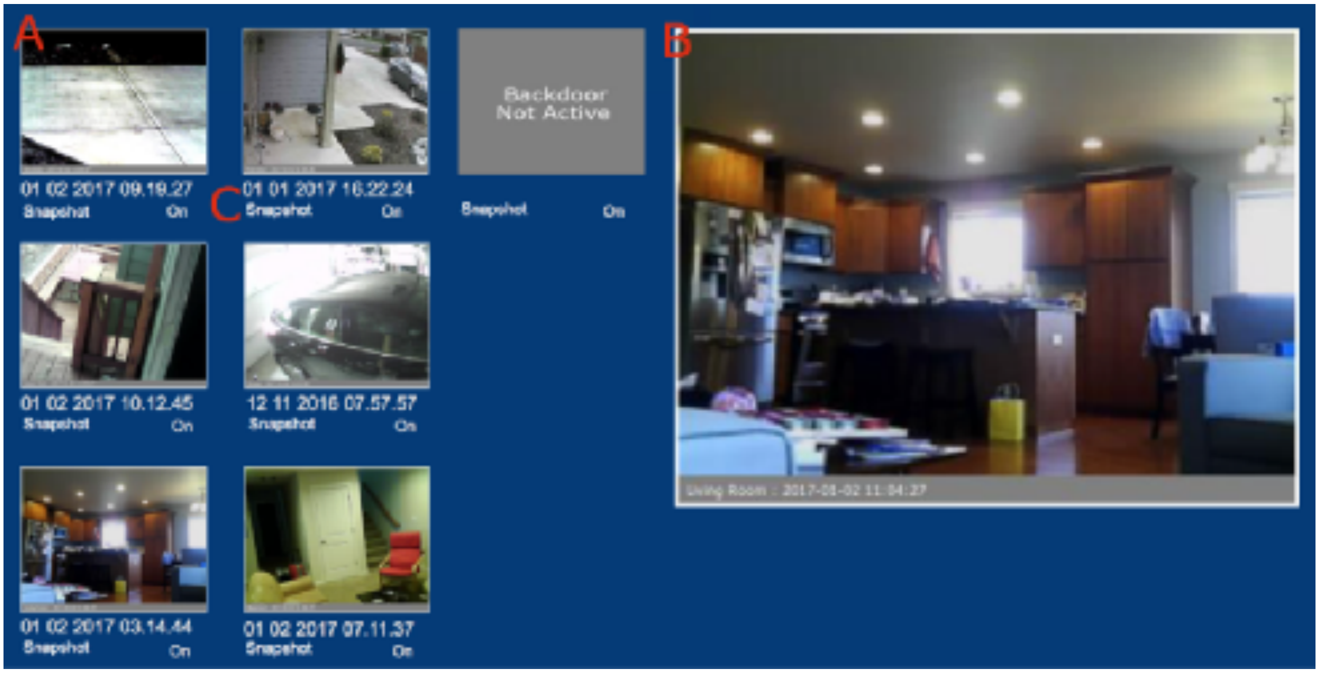
Recording[01-10]: List of last 10 recordings - the most recent recording is number 1. Saves the date and time of the recording. Can be used on control pages to show the date and time of recent recording.

Appendix

Examples

Here is how I have my cameras setup to give an idea of how to use the different images that are produced.

Main Camera Page

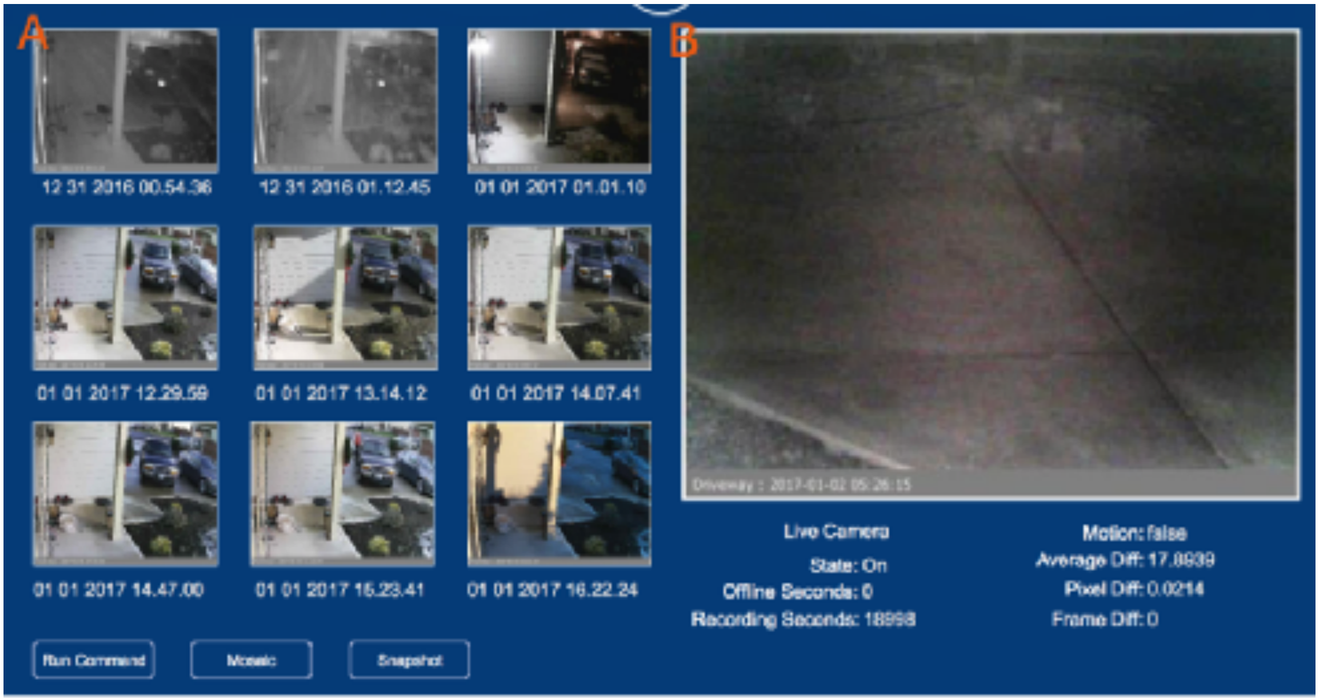


A: The small view of each camera uses the CurrentImage.jpg file used in each of the specific camera folders. Clicking on the image runs the Master Image action setting the master image to the specific camera.

B: This refreshes the Master1.jpg image contained in the base folder. This the currently selected Master Image (changed through the Master Image action referenced above).

C: This shows the recording 1 state (the date and time of the most recent recording). It is also a link that switches to the detail camera page.

Detail Cameras Page



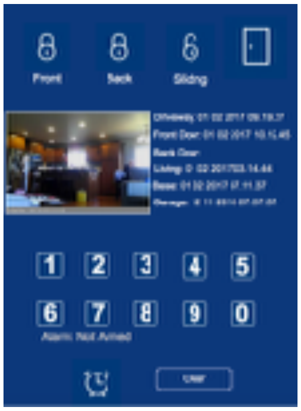
Live Camera
State: On
Offline Seconds: 0
Recording Seconds: 18998

Motion: false
Average Diff: 17.8939
Pixel Diff: 0.0214
Frame Diff: 0

A: Thumbnail00[1-9].jpg from the camera's image folder. This represents the last 9 recordings. Clicking on any one of the recordings changes the Master2.jpg, showing 30 seconds (30 frames) of the most recent recording.

B: This is a refreshing version of Master2.jpg from the base camera folder. It displays either the MasterImage (if that was the last item selected) or the 20 frames of the last selected recording.

iPhone Page



Driveway: 01 02 2017 09.19.37
Front Door: 01 02 2017 10.15.45
Back Door:
Living: 0 02 2017 03.14.44
Base: 01 02 2017 07.11.37
Garage: [illegible]

On my iPhone sized screen I use the CarouselImage.jpg found in the base directory. This cycles through all of my cameras, switching cameras every 4 seconds. Clicking on the image runs the Pause Carousel action that stops the switching.

Notification

I also have a trigger setup that when the cameras detect motion the plugin runs the Mosaic action (2x3 of the last 6 images) that I then text to myself.

CPU Usage

System configuration:
Mac Mini (Late 2014)
Processor: 1.4 GHz Intel Core i5
Memory: 4 GB 3600 MHz DDR3
Graphics: Intel HD Graphics 5000
Image capture size: 470x360

	1 Camera	2 Cameras	6 Cameras
Camera Only (No jpeg Compression)	10% cpu	15% cpu	40% (System 25%*)
Camera Only (Medium jpeg Compression)	9% cpu	14% cpu	35% (System 26%)
Camera with Motion	11% cpu	18% cpu	65% (System 40%)

* across all cores for User

Change Log

1.6.1

- Save a low resolution version of the Mosaic
- Further reduce file size of the low res image
- If a camera is turned off (via Actions) it will not be displayed in the carousel
- Misc bug fixes

1.6 - Bandwidth Release

- Snapshots:
  - Ability to specify the resolution of images when using the snapshot action
- Master Image:
  - New Master Image that can toggle between high and low resolution.
- Carousel:
  - Low resolution carousel.
  - Pause camera loop
  - Manual forward camera loop
- Recordings
  - Play/Pause Recording
  - Forward/backward frames in recordings
  - Flag to show if a recording has been played before
- Bug fix
  - Fixed issue when trying to play a recording and the recording does not exist

1.5.4

- Fixed issue with error when loading a master image if there is a missing recording
- Fixed issue where the Camera Command action was not being displayed

1.5.3

- oops…

1.5.2

Changes on how images are processed:

- Option to specify the JPG compression (original, high, medium, low).
- Sizing of the image keeps the original aspect ratio versus scaling. Black bars will show either above/below or left/right of the original image.

File type camera:

- Ability to pull an image from a local file

Misc Changes:
- Select to use urlib or urlib2 for image capture
- Simplified some of the configuration setup

1.5.1
- Fixed an issue where a camera could go unavailable and would require a re-load of the image to recover. The plugin will now continue to retry a camera if it goes off line.
- Switched to urllib2 to get images versus urllib. To accomplish this the user name/password needs to be stored as separate fields

Note: I attempt to pull the user name and password from the original url. If this doesn't work, you may need to manually update the url, user name, and password.

1.5
- Improved handling of threads
    - Reduced chance of run away threads
    - Improved performance
- Improved identification of cameras that are unresponsive
    - Changed naming convention of original files to reduce file copying

Note: known bug that if a camera's url does not return any error but doesn't load an image the device will not recover. Increasing the timeout period helps rectify this error.

1.4
- Moved all code away from ImageMagick and to native Python Pillow code for all image manipulation. Move to a more native program that was not reliant on external code.

Note: Run 'sudo pip install Pillow' before updating
Note: May need to open and save each device
- Fixed issue with AirFoil
- Added check version code to assist with auto updates.
- Significant code optimization to improve future changes and updates.
- Added ability to run a camera command (url command).
- Added ability to turn off image manipulation
- Added ability to turn off motion detecting

1.3.10
- bug fixes

1.3.6

- Added a max Sensitivity and a Minimum Sensitivity to allow for more precise motion configuration
- bug fix on creating a new device

1.3.5

- Action: Take Snapshot - save single image to file
- Action: Take Mosaic - save last six images into a singel image mosaic
- Improved motion detection
- changed to label format for date stamp

1.3.4

- Camera not available/off default image
- Removed CameraStatus state
- CameraState = No/Yes/Unavailable
- Image enhancement flags
  - Auto Level
  - Normalize
  - Enhance
  - Image Border
  - Image width and height
- single line for URL
- Toggle Carousel - click on carrousel image to hold camera/rotate

1.3.3

- Use symbolic links for Master images to reduce file IO
- bug fixes
- improved process for checking if a camera is responding

1.3.2

- thread tracking to decrease potential duplicate threads open
- combined imagemajick command into single line
- improved image management
- other bug fixes

1.3.1

- bug fixes

1.3.0

- initial release to Indigo forum
- motion detection on cameras

1.2.0

- camera recording

1.1.0

- image carousel
- master image switching

1.0.0

- initial image capture