

APDM Video Guide

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1 Working With Video

Motion Studio comes with the functionality to collect video that is synchronized with your inertial recordings. In other words, when you start/strop a recording in Motion Studio, the connected video camera(s) will start/stop at the same time. Currently, Apple iDevices (iPhone, iPad, and iPod) devices running the Videography app are supported.

1.1 Using Videography and Apple iDevices

The iDevices solution makes use of an app available on the Apple Store named Videography (http://appologics.com/videography). This software must be purchased and installed on each iDevice that you wish to use. Videography must be the open, running application on the iDevice in order for it to be triggerable.

1.1.1 Network Setup

The Videography cameras and the computer running Motion Studio need to be mutually reachable on the network. There are three possible configurations:

- **Common Local network:** In this configuration, your computer and the Videography cameras are all connected to the same local Wi-Fi network. Typically, this means that these devices are all on the same subnet, meaning that the first 3 octets of the 4-octet IP addresses are the same on your computer and all connected iDevices. For example, your computer may have the IP address 192.168.1.10 and your cameras may have IP addresses 192.168.1.11 and 192.168.1.12. This is the easiest setup to use, as your devices maintain internet access to the outside world through the standard internet connection.
- Ad-hoc network: In this configuration, you create an ad-hoc network on your computer running Motion Studio and connect each Videography camera to this network individually. In this mode, your computer running Motion Studio and the Videography cameras may not have access to the internet, unless you configure your computer to use a different network connection while its Wi-Fi adapter is being used for the ad-hoc network (e.g., you can use Ethernet for your internet connection and the ad-hoc Wi-Fi network for camera control). This option is useful when no other Wi-Fi network is available.
- Different Wi-Fi networks: Even if the laptop and your Videography cameras are on different networks, such as two different Wi-Fi access points within one clinic or two computers in different cities, it may still be possible to remotely control them. The key requirement is that the IP address of the Videography cameras is reachable on port 80 (the standard web port). This may, however, require some advanced networking practices, such as port forwarding.

1.1.2 Camera Configuration

- Enable the use of Videography cameras:
 - Click View→Options in the File Menu.
 - Select "Enable Videography video integration"
 - Click "Done" and restart the application

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Videography Ca 1 Videography c	Ingraphy Cameras Ideography camera ready for recording					
Add Camera a	t http:// 192.168.1.124		Auto-Detect Cameras			
Cameras Ready Configure Remove	Camera Name Titan	Camera IP 192.168.1.12	4			
Automatically	Transfer Videos?		Close			

The Videography Camera Configuration Dialog

- Click Video→"Manage Videography Cameras". You will see a configuration dialog similar to the one above.
- If your computer and all Videography cameras are on the same Wi-Fi network, you can use the Auto-Detect Cameras feature to automatically find and add your Videography cameras. Please note that this takes 20s or so. Alternately, you can add the IP address of each camera individually in the text field at the top and clicking on the "Add Camera at http://" button. Note: You can determine the IP address of the Videography camera by clicking on Settings→"Remote Control" and looking at the Wi-Fi address field.
- If you wish to configure your camera, select it in the dropdown list and click the **Configure** button.
 Note: You can access the same configuration dialog through a web browser by entering the camera's IP address into the browser's address field or by using the software's configuration options directly through the iDevice.
- You can select the Automatically Transfer Video option if you want video to be transferred back to your computer immediately following the video capture. Due to the potentially large size of the video files, you may want to avoid this if you are collecting long video segments with brief periods of inactivity between them or if your network speeds are slow, as active video transfers may interfere with an active recording session. Videos can easily be transferred using the video management tool at a later time.
- If a Videography camera is listed here that you no longer wish to trigger, select it and click the **Remove** button.

1.1.3 Triggering The Camera

- When you open up the recording dialog, a Videography widget will be visible among the recording controls. This widget will indicate how many cameras are configured for recording. Communication with each configured camera is checked when the recording dialog is opened, so it is possible that one or more expected cameras do not appear on this list if they are experiencing network issues, have shut down, have switched to another application, etc. If the list doesn't match up with your expectations, click on the Videography icon within this widget to re-open the configuration dialog.
- When you start an inertial recording from within Motion Studio, the camera(s) will start recording (each camera will display on its own screen that it is recording). When you hit stop, the camera will stop recording.
- If you have the "Automatically Transfer Videos?" option set, the video will be transferred to the computer running Motion Studio. If not, you can use the Video Manager to transfer and view these files at a later time.

Recordings							
ae and transfer Video	graphy videos you have recorded						1
ge and transfer video	graphy videos you have recorded.						
	Time of recording	Duration	Resolution	Size	Camera	File Name	Retrieved
Transfer Selected	Tue Apr 22 09:12:45 PDT 2014	00:00:05	640x480	1.1 MB	Titan	20140422-061240 Dive c88bf0aa.mp4	true
	Tue Apr 22 10:38:02 PDT 2014	00:00:09	640x480	4.4 MB	Titan	20140422-133752 Dive c88bf0aa.mp4	true
insfer Untansferred	Tue Apr 22 10:44:59 PDT 2014	00:00:11	640x480	5.3 MB	Titan	20140422-134447 Dive c88bf0aa.mp4	true
	Tue Apr 22 10:47:37 PDT 2014	00:00:07	640x480	3.4 MB	Titan	20140422-134730 Dive c88bf0aa.mp4	true
Remove Selected	Tue Apr 22 10:51:13 PDT 2014	00:00:07	640x480	3.5 MB	Titan	20140422-135105_Dive_c88bf0aa.mp4	true
	Tue Apr 22 10:56:58 PDT 2014	00:00:15	640x480	7.2 MB	Titan	20140422-135642_Dive_c88bf0aa.mp4	true
Play Video	Tue Apr 22 10:59:50 PDT 2014	00:00:22	640x480	10.3 MB	Titan	20140422-135927_Dive_c88bf0aa.mp4	true
	Tue Apr 22 11:03:07 PDT 2014	00:00:11	640x480	5.1 MB	Titan	20140422-140256_Dive_c88bf0aa.mp4	true
	Tue Apr 22 11:06:32 PDT 2014	00:00:10	640x480	4.9 MB	Titan	20140422-140621_Dive_c88bf0aa.mp4	true
	Tue Apr 22 11:09:22 PDT 2014	00:00:22	640x480	10.4 MB	Titan	20140422-140859_Dive_c88bf0aa.mp4	true
	Tue Apr 22 11:12:24 PDT 2014	00:00:09	640x480	4.3 MB	Titan	20140422-141215_Dive_c88bf0aa.mp4	true
	Tue Apr 22 11:14:30 PDT 2014	00:00:09	640x480	4.3 MB	Titan	20140422-141420_Dive_c88bf0aa.mp4	true
	Tue Apr 22 11:17:24 PDT 2014	00:00:10	640x480	4.8 MB	Titan	20140422-141713_Dive_c88bf0aa.mp4	true
	Tue Apr 22 11:20:19 PDT 2014	00:00:11	640x480	5.2 MB	Titan	20140422-142008_Dive_c88bf0aa.mp4	true
	Tue Apr 22 11:23:06 PDT 2014	00:00:06	640x480	3.2 MB	Titan	20140422-142258_Dive_c88bf0aa.mp4	true
	Tue Apr 22 11:25:38 PDT 2014	00:00:11	640x480	5.4 MB	Titan	20140422-142526_Dive_c88bf0aa.mp4	true
	Tue Apr 22 11:48:24 PDT 2014	00:00:15	640x480	6.2 MB	Titan	20140422-144808_Dive_c88bf0aa.mp4	true
	Tue Apr 22 11:50:54 PDT 2014	00:00:14	640x480	6.2 MB	Titan	20140422-145039_Dive_c88bf0aa.mp4	true
	Tue Apr 22 11:55:54 PDT 2014	00:00:14	640x480	4.9 MB	Titan	20140422-145540_Dive_c88bf0aa.mp4	true
	Tue Apr 22 11:59:47 PDT 2014	00:00:12	640x480	4.9 MB	Titan	20140422-145935_Dive_c88bf0aa.mp4	true
	Tue Apr 22 12:03:30 PDT 2014	00:00:11	640x480	4.4 MB	Titan	20140422-150319_Dive_c88bf0aa.mp4	true
	Wed Apr 23 06:57:22 PDT 2014	00:00:10	640x480	4.4 MB	Titan	20140423-095710_Dive_c88bf0aa.mp4	true
	Wed Apr 23 06:59:01 PDT 2014	00:00:11	640x480	5.0 MB	Titan	20140423-095847_Dive_c88bf0aa.mp4	true
	Wed Apr 23 07:00:51 PDT 2014	00:00:11	640x480	4.9 MB	Titan	20140423-100038_Dive_c88bf0aa.mp4	true
	Wed Apr 23 07:02:10 PDT 2014	00:00:13	1920x1080	26.9 MB	Titan	20140423-100153_Dive_c88bf0aa.mp4	true
	Wod Apr 22 07.02.21 DDT 2014	00.00.11	1020-1080	22.1 MR	Titan	20140423_100317 Dive c88bf0aa mp4	truo

1.1.4 Managing Videography Videos

The Video Management Tool

All recorded Videography videos will be logged in the **Video Management Tool**. This tool will help you keep track of when the recordings were made, which inertial recordings they are associated with, properties of each video (e.g., resolution, size), and whether the video has been transferred from the camera to your computer yet.

• The videos will end up in the following folder:

INSTALL_FOLDER\Mobility Lab\workspace\CURRENT_PROJECT_FOLDER\videos

- If you are using Mobility Lab, the CURRENT_PROJECT_FOLDER is named "MobilityLabProject"
- Video Properties:
 - Time of Recording: The time when both the inertial and video recording were initiated.
 - Duration: The duration of the recording
 - Resolution: The video resolution
 - Size: The disk size of the video recording
 - Camera: The name of the iDevice running Videography.
 - File name: The name of the video file after it has been transferred. This matches the name of the recorded inertial file, with an addition to identify the source camera (needed if multiple cameras are used for simultaneous video).
 - Retrieved: Whether the video has been transferred from the remote camera to your computer yet.
- Actions
 - Transfer Selected: Transfer any selected videos from the remote camera to your computer. The iDevices that you are transferring the videos from must all be running Videography and must be connected through the use of the Camera Configuration Dialog. You can click on the "Manage Cameras" button on the bottom of the dialog to open up the Camera Configuration Dialog.
 - Transfer Untransferred: Transfer any videos that have not yet been retrieved.
 - **Remove Selected:** Remove the selected video(s) from the video log.
 - Play Video: Play the selected video. This function only works if the video has already been transferred.
- Note: We do not currently have a tool to view raw inertial data along side the video(s), but this is planned for a future release. These videos should be playable on any modern computer. If you have issues with playback, try downloading VLC (http://www.videolan.org/vlc/index.html)

1.1.5 Synchronization Performance

We have measured the following characteristics regarding synchronization between the video and inertial recordings:

- Mean synchronization error : 100ms
- Standard deviation of the synchronization error: 80ms
- Max synchronization error: 250ms

This variability comes from the communication overhead and when the iDevice actually starts recording. This should be sufficient for most types of recordings, but may be slightly inaccurate when looking at very fast or brief actions.

1.2 Using a GoPro Camera

Our integration with GoPro cameras is not as robust as the Videography integration due to limitations of the camera and network design. GoPro also does not provide official support for external control of their cameras, so our GoPro support may unexpectedly stop in the future. Due to the ubiquity of these cameras, however, we will do our best to support the remote triggering of GoPro cameras.

$\bigcirc \bigcirc \bigcirc$					
Camera Status					
Could not connect to camera					
Refresh					
Trigger Camera When Recording					
Video Format					
● 800x480, 60fps					
800x480, 120fps					
1280x720, 30fps					
○ 1280×720, 60fps					
○ 1280×960, 30fps					
○ 1280x960, 60fps					
1920x1080, 30fps					
Set Format					
Power On Power Off					
Start Recording Stop Recording					
Close					

The GoPro Configuration Dialog

1.2.1 Network Setup

- The GoPro camera must either be a Hero 2 camera with the Wi-Fi bacpac add-on, or a Hero 3 camera with integrated Wi-Fi bacpac.
- Your computer running Motion Studio must have a Wi-Fi adapter.
- Connect your computer to the GoPro's Wi-Fi access point, as you would any other Wi-Fi access point. The default wireless password is "goprohero". If this has been changed, it needs to be changed back to this default value.

1.2.2 Camera Configuration

- Enable the use of a GoPro camera:
 - Click View \rightarrow Options in the File Menu.
 - Select "Enable GoPro video integration"
 - Click "Done" and restart the application
- Go to the Video→GoPro option in the menu bar. This *should* communicate with the GoPro and retrieve a subset of the camera settings for display.
- Assuming the connection went correctly, you can set the resolution and framerate from this display and test triggering the start/stop functionality. There is also a checkbox "Trigger Camera When Recording". If this is checked, the camera will automatically start and stop when you start and stop wireless recording from within Motion Studio.
- Other configuration options need to be set from within the camera itself.