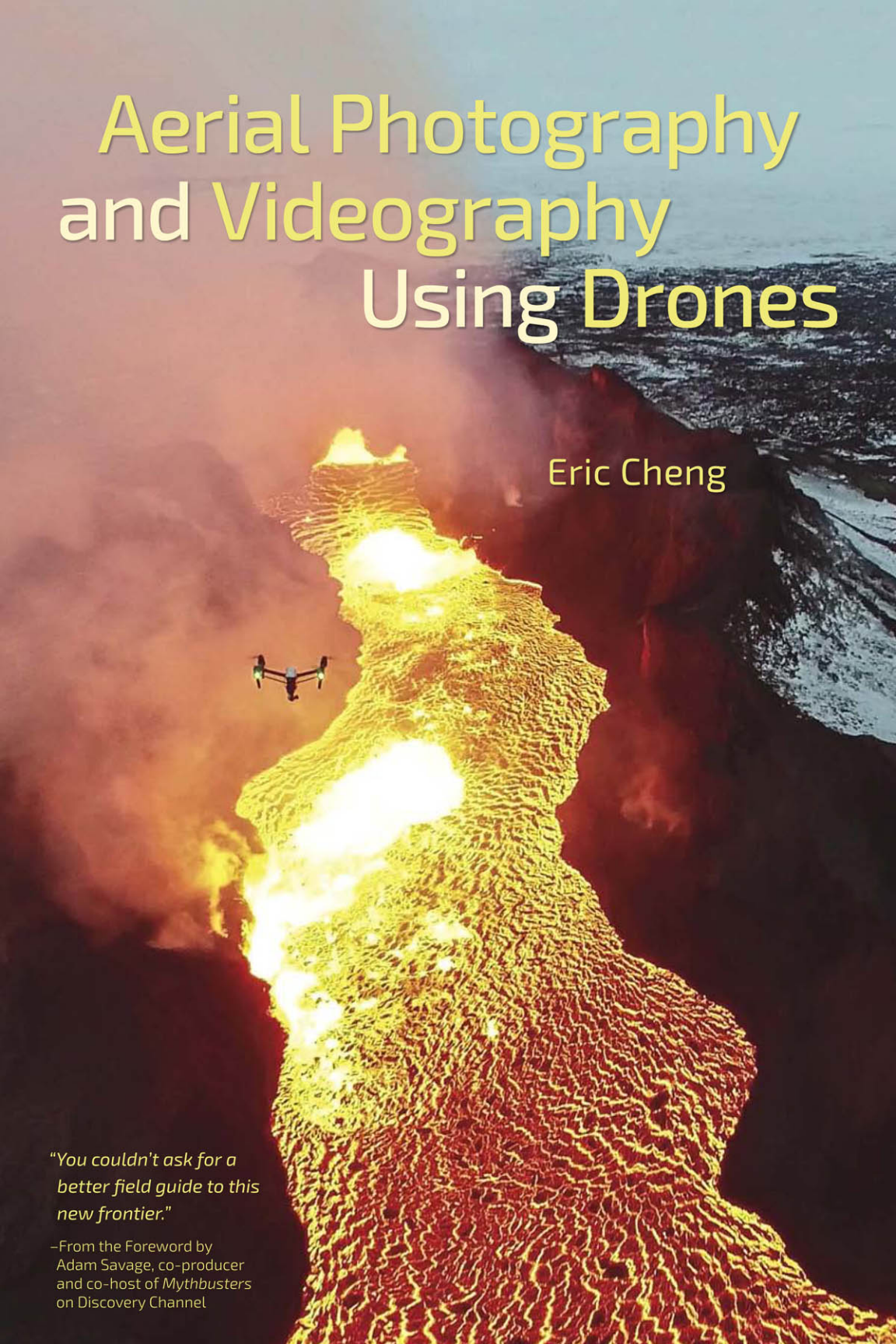
Aerial Photography and Videography Using Drones

Eric Cheng



"You couldn't ask for a better field guide to this new frontier."

–From the Foreword by Adam Savage, co-producer and co-host of *Mythbusters* on Discovery Channel

Aerial Photography and Videography Using Drones

Eric Cheng

"You couldn't ask for a better field guide to this new frontier."

—From the Foreword by Adam Savage, co-producer and co-host of *Mythbusters* on Discovery Channel

Peachpit Press

- Pay attention to the general composition of your scene and adjust exposure compensation accordingly. For example, if you're taking pictures over snow, you might need to overexpose to compensate for the camera trying to make the snow gray. If you're taking pictures over the ocean, you might need to underexpose because the camera might try to brighten the water automatically.

Note that cameras like GoPros offer only limited control of exposure. See the "GoPro" section later in this chapter for details.

FOCUS

Unless you're using a professional camera drone, it's unlikely that you will ever have to focus your aerial camera. Most aerial cameras have small sensors and fixed apertures. They're prefocused at the hyperfocal distance, which means that very close objects might not be in sharp focus.

Some integrated camera drones are now shipping with larger sensors and variable-aperture lenses that do need to be focused. If you have one of these drones, treat focus as you would when using a land camera: Think about it before you shoot. Many people who have been shooting using current camera drones have stopped thinking about focus in the air, and it will take some time to remember that most photography does actually require thinking about focus (or having an intelligent camera do it for you).

FRAME GRABS FROM 4K VIDEO

Many current camera drones are capable of capturing 4K video (including high-end consumer drones from DJI, and all drones that use the latest GoPro HERO cameras). We'll talk specifically about shooting aerial video in the next chapter, but it's also important to note that 4K video can be useful for capturing stills, as well. The resolution of 4K video is typically either 4096x2160 pixels ("4K") or 3840x2160 ("4K UHD"), both of which are over 8 megapixels. This means you can extract reasonable still images from 4K video by exporting screen grabs from the original video.

You'll achieve the best results by shooting video at fast shutter speeds when your drone is moving slowly. Fast shutter speeds will freeze any motion in your scene, and a slow-moving drone will prevent rolling-shutter artifacts from making vertical lines slant during movement.

One of my most popular aerial still images is on the cover of this book and was actually created by exporting a frame grab from a 4K video (**FIGURE 3.4**)!

You can export a frame grab using various methods, depending on whether you're viewing the video on a computer or smart device. If you don't know how to do this, do a Google search for *screen shot video [platform]*, replacing *[platform]* with the kind of computer or smart device you are using.

FIGURE 3.4 This image of a DJI Inspire 1 flying over the Holuhraun volcanic eruption in Iceland in January 2015 is actually a frame grab from an aerial 4K video taken with a second Inspire 1. Shared photo credit: Eric Cheng / DJI & Ferdinand Wolf / Skynamic.

Integrated Cameras

At the moment, DJI's Phantom 3 series and Inspire 1 are the most popular camera drones on the market. Their integrated cameras are comparable in image quality to the GoPro HERO4 (they use the same sensor and internal processor) but feature the integration advantages listed previously. Because DJI's integrated cameras are so popular, I'll use the DJI GO mobile app to illustrate all the camera settings in this section.

Integrated camera drones offer many benefits to users, especially in feature set and user interface, but many models are not upgradable, meaning that you cannot swap out the camera for a better one later. The DJI Inspire 1, however, does feature a modular drone camera mount—the first of its kind.

REMOTE CONTROL

Integrated drones have cameras that can be controlled remotely by physical interfaces on the remote controller and/or via a mobile app. First-generation integrated drones like the DJI Phantom 2 Vision and Vision+ had cameras that could be controlled only by mobile app (aside from gimbal pitch, which could be controlled by a lever or dial on later revisions of the drones). These were great first steps in how integrated drones might work, but mobile app-controlled cameras proved cumbersome because photographers had to remove their hands from the sticks in order to take a picture.

Modern integrated drones like the DJI Phantom 3 and Inspire 1 feature custom remote controllers with buttons and dials that allow for full camera control. These newer drones are starting to feel like remote cameras rather than drones that happen to carry cameras. The Phantom 3's and Inspire 1's controllers have buttons for taking a picture and starting/stopping video recording, as well as dials you can use to change all exposure variables (supporting full-manual exposure) and pitch the gimbal up and down (**FIGURE 3.5**).

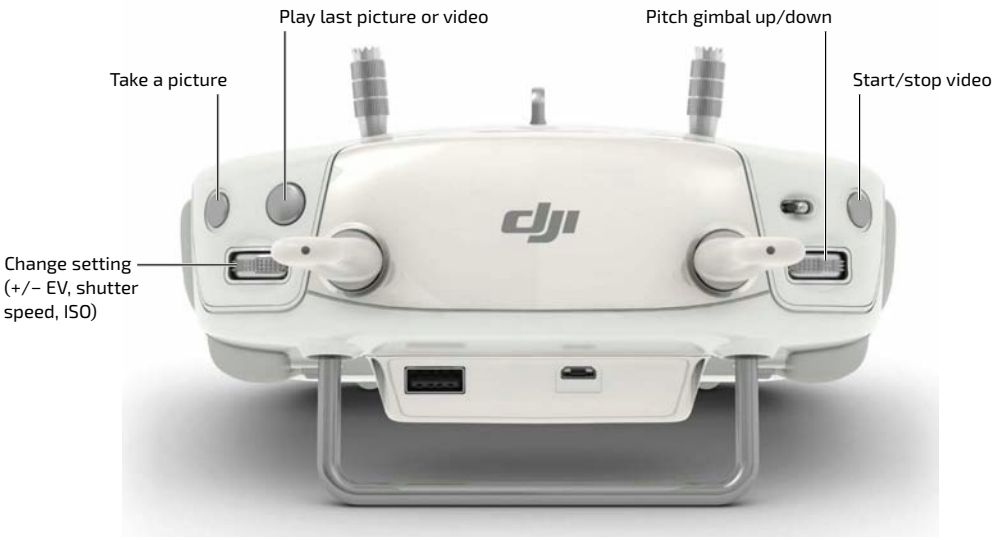


FIGURE 3.5 The DJI Phantom 3 remote controller includes physical buttons and dials for all camera controls.

Integrated, physical camera controls are among the main benefits of integrated camera drones. Photographers can plan compositions, take only the pictures they want to take, and change settings between shots, just like they do when using a land camera. Nonintegrated cameras tend to be used in interval shooting mode (also sometimes called *time-lapse* mode) and left to continue shooting during the entire flight. Changing settings is difficult or impossible because you can't get physical access to the camera without landing the drone.

When I use an integrated camera drone, I feel like I'm operating a camera that happens to be in the air, instead of a drone that happens to be carrying a camera. Approaching aerial imagery this way once you've mastered drone operation will greatly improve the quality of the images you capture during flight.

EXPOSURE CONTROL

Integrated camera drones typically offer exposure control that can be set during flight. In earlier DJI models like the Phantom 2 Vision and Vision+, exposure control was a single slider in the DJI Vision mobile app. This interface was one of the first in a consumer product to allow for live exposure control during a camera drone flight; earlier and competing products required physical access to a third-party camera, requiring pilots to land to change exposure. Although being able to change exposure while in the air was convenient, pilots still had to access the controls via a smartphone, which meant that they had to take their hands off the control sticks, leaving the drone in a hover or allowing only for awkward piloting with the use of only one hand.

Newer drones have moved nearly all camera controls to the remote controller itself (**FIGURE 3.6**). Full manual exposure control (ISO and shutter speed; aperture is fixed), gimbal tilt (and roll, on the Inspire 1), shutter control, and playback can all be done without removing one's hands from the sticks.

FIGURE 3.6 The DJI GO app for DJI Phantom 3 and Inspire 1 features all the camera settings you'd expect to find in a land camera.

In addition, the DJI GO app features a rich set of touchscreen exposure control actions, including the following:

- Tap to auto-expose
- Tap and hold to lock exposure
- Tap and drag to move gimbal

BURST MODE

Some integrated camera drones can shoot in small bursts. The DJI Phantom 3 series and Inspire 1 can shoot in rapid bursts of up to seven pictures in a row. You can select burst mode by tapping and holding down the virtual shutter button in the DJI GO's app's camera screen and trigger bursts by tapping the virtual shutter button (**FIGURE 3.7**).

FIGURE 3.7 Burst mode controls in the DJI GO app for Phantom 3 and Inspire 1, with Seven Shot selected

EXPOSURE BRACKETING

The DJI Phantom 3 series and Inspire 1 also feature automatic exposure bracketing in three- or five-shot bursts with 0.7 stops between each pair of pictures (**FIGURE 3.8**). You can select exposure bracketing mode by tapping and holding down the virtual shutter button in the DJI GO app's camera screen.

FIGURE 3.8 Automatic exposure bracketing in the DJI GO app for Phantom 3 and Inspire 1, with three- or five-shot brackets available

INTERVAL SHOOTING

Just because an integrated camera drone has an explicit shutter release control doesn't mean that it can't be flown while automatically taking pictures.

Interval shooting (**FIGURE 3.9**) is useful when a pilot doesn't want to think about taking pictures during flight or for creative shooting such as time-lapse photography (see "Advanced Techniques" later in this chapter).