On location with the Yuneec Typhoon H sporting the Lume Cube lights to help illuminate the scene of mountain-bike competitor Sam Wiernucki.

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LIGHT UP THE NIGHT

WE TEST THREE TOP PORTABLE LIGHTS

BY **DAVID TOLSKY** PHOTOS BY **CARL HYNDMAN & DAVID TOLSKY**

I recently had the fortune of test flying three independent light sources for nighttime flying. Depending on what your project is, you might want to illuminate the crops below you; a person walking or in a vehicle; or your background hills, buildings, etc. Aircraft used for testing purposes were the DJI Phantom 3 Advanced and 3DR Solo.

We are going to take a comparative look at Lume Cube lights, FoxFury's Rugo lights, and the Fiilex AL250 lights. The first two are not necessarily built with drone flight in mind, but their size, shape, and weight lend themselves to these aircraft. The Fiilex AL250 is a unit you've no doubt already heard about, a collaborative project between 3DR and Fiilex. The AL250 is the only light I would not attempt to install on the Phantom 3–there's no place to put it.

All but the Lume Cube are still in prototype stages but might be in mass production by the time you read this. For this article, I looked at the quality of the emitted light, balance issues (if any) of the aircraft, adaptability, illumination time per charge, and price.

If you're like me, chances are that you have some spare GoPro accessories. My organized tray of GoPro mounting arms and adapters proved invaluable in adapting these lights to the previously mentioned aircraft. Let's get started.

Lume Cube

The Lume Cube measures approximately 1 1/2 x 1 3/4 inches and yields 10 levels of light intensity and a strobing option.

These versatile lights are built like a tank yet small enough to take anywhere, and they're amazingly bright. The company says that they are built to dive into 100 feet of water, but I don't see you attempting that with your drone anytime soon! You get a pair of 3D-printed, lightweight plastic brackets. On a DJI Phantom, these brackets snap in snugly between the posts of the right and left landing gear. A 1/4-inch threaded screw at the center of each bracket allows it to be attached to the Lume Cube. With a little playing around, you can configure the Lume Cubes to look straight ahead, straight down, or wherever you can position it on that one axis. This is great, but I found myself wishing for a ball-and-socket joint so that I could have more flexibility in lamp position. Nevertheless, the Lume Cubes performed flawlessly in flight and never lost their position. Ten separate clicks on the left button let you change the light intensity.

A cool option that you're sure to appreciate is the button with which you can use to set the strobe. You can actually set the speed of the strobe using a slider on the Lume Cube app, but we'll get to that in a bit. There are no balance issues when flying the Lume Cubes on the DJI Phantom 3 Series, and the aircraft handles the extra weight like a champ! The Phantom is built in such a way that you can add a unit only to the landing gear.

I wasn't going to stop at the Phantom 3. I knew that Lume Cube made a dual Cube GoPro mount for use with a camera and selfie stick. That's all I needed to adapt the Lume Cubes to the 3DR Solo aircraft. First, I kept the gimbal/GoPro camera installed, then I affixed an adhesive mount to the back underside of the aircraft. For balance purposes, I made sure that I could swing the extension arms back and forth, and it's a good thing that I did: Flying with dual Cubes in the back caused a tail-end shakiness that would never do for smooth video. Simply loosening the extension arm of the dual mount, hinging it forward toward the middle of the aircraft, and retightening it did the trick, erasing the bad balance and illuminating a dark ground.

As previously mentioned, a cool feature for the Lume Cubes is their app, which enables Bluetooth remote control from your smartphone. You'll be able to control the intensity as well as speed of strobing. Before you get too excited, the Bluetooth integration does not work well when you're flying the Lume Cubes, so you'll need to set them up before you fly. Like the other units in this article, there is no remote on/off integration at this time: You turn the Lume Cubes on before you take off and turn them off when you land. Each Lume Cube retails at $79.99. Tip: Buy both mounts that Lume Cube offers, the selfie stick GoPro mount, and the Phantom landing gear brackets. These will give you a lot of creative flexibility to try different things with different lights.

Here's a 3DR Solo dual GoPro mount, underslung using a Solo GoPro mount in place of a gimbal camera.

Phantom 3 Advanced flies Lume Cubes using their landing-gear mounts.

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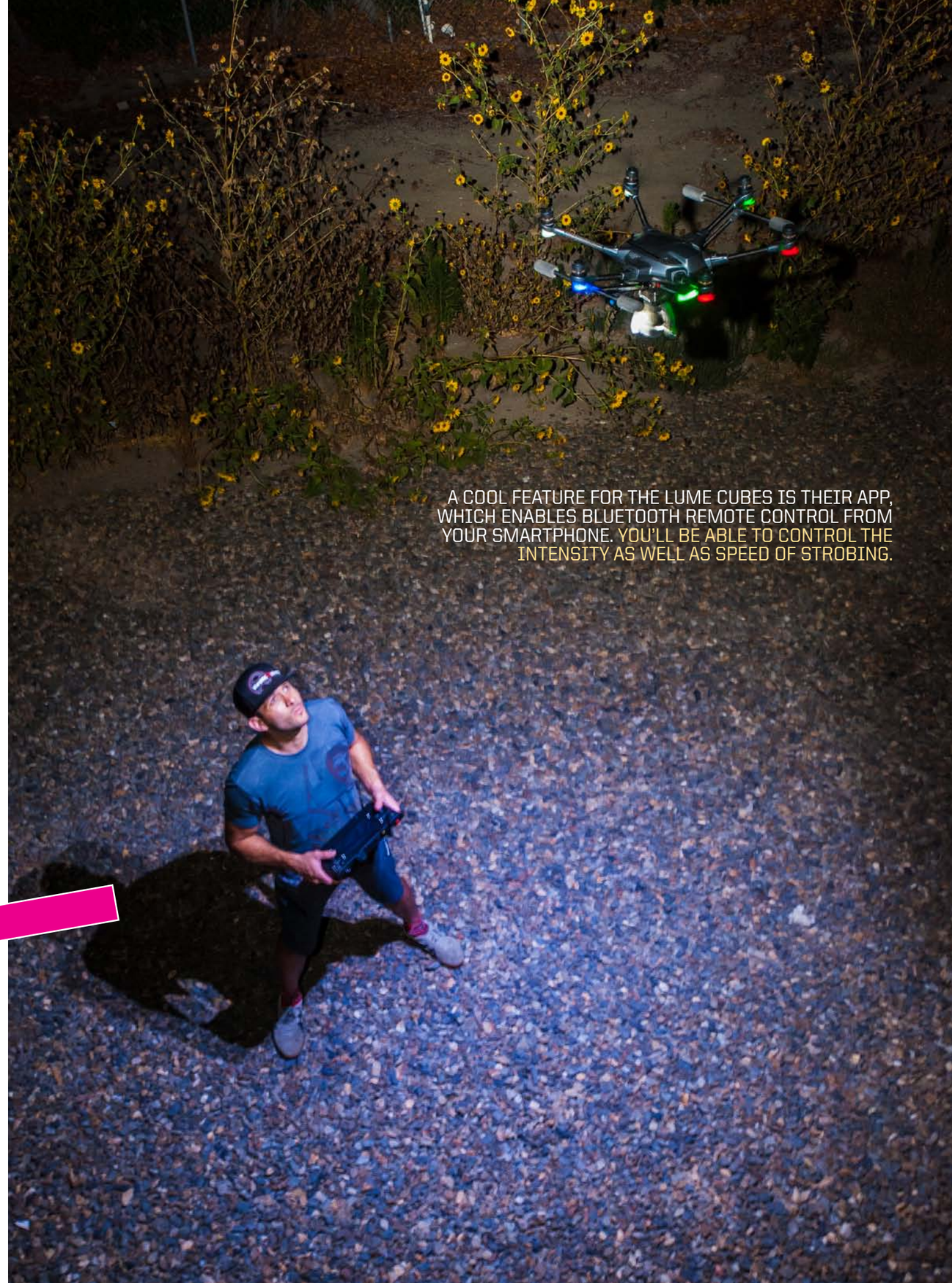

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FoxFury Rugo Lights

The nifty little Rugos are ruggedly built and have power packs that are interchangeable. They can be charged with a standard USB cable or the provided charger. Power them on with four presses of the yellow side button for variable intensity. A cool feature on the Rugos is a sliding lens that includes spot, area, and flood settings. Another great thing is that the Rugo comes with a few different mounting options, including the all-important GoPro mount.

When I first saw a Rugo, one was mounted on a 3DR Solo for display purposes. The great thing about the Solo is that its gimbal is easily removable and replaced with a GoPro mount. That's one option if you want to fly without a camera, but you don't have to. There's an area under the aircraft embossed with the word "Link." I checked with 3DR, and a rep said that it was safe to mount a double-stick GoPro adhesive mount there. Click in a GoPro arm with perhaps another adjustable swing arm to attach the Rugo and enable it to point and/or pivot how you want to direct the light. That works fine for a single lamp setup. The balance of the aircraft in flight is fine with the gimbal and camera also attached.

A FoxFury Rugo Light with affixed GoPro mounts on its top and bottom and a variable sliding lens.

I also tried a dual-lamp setup with a double-stick mount applied to opposite side edges of the aircraft. Before takeoff, I received "Magnetic Interference" warnings on the screen several times. I was not certain this was caused by the Rugos, but after examining the Rugo power packs, I saw some metal parts that could cause the interference. After a little playing around and flying without the lamps, I was able to fly the dual Rugo setup with no aircraft balance problems.

What about adapting the Rugos to fly on a Phantom? With a little creativity and the use of the Lume Cube mounting brackets, I made it work. Where the Lume Cube brackets have a 1/4—20 screw, simply screw in a GoPro tripod adapter to each one and then you will be able to build off those to attach them to the Rugos. I flew the Phantom 3 Advanced with this lighting setup with no balance problems, which I believe says a lot for that little Phantom's lifting power! The presale price for the Rugos is $160.00 each.

Here's a 3DR Solo dual Rugo setup. Start with side-mounted GoPro adhesive mounts, and add pivoting extension arms to the light.

DJI Phantom 3 Advanced flies Rugo Lights using Lume Cube landing-gear mounts, GoPro tripod adapters, and pivoting extension arms.

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CLICK IN A GOPRO ARM WITH PERHAPS ANOTHER ADJUSTABLE SWING ARM TO ATTACH THE RUGO AND ENABLE IT TO POINT AND/OR PIVOT HOW YOU WANT TO DIRECT THE LIGHT.

Fiilex AL250

Press a button to turn on this light source and you expect to hear the sound effect of a Star Wars lightsaber! This is one powerful light that is really only meant to be installed on the 3DR Solo aircraft. The AL250 is designed to fly in place of Solo's gimbal or The Frame–mounted GoPro camera. It uses the same GoPro aircraft mount found on The Frame. Whether you want to extend a swing arm or mount the light right to the aircraft is up to you, but keep in mind that Solo needs level ground to take off and will tell you if you don't have it. Use the extended rubber feet for Solo, and make sure that the light is farther off the ground than the landing feet. Position the angle of the light in the desired beam direction, and tighten the thumbscrew. That's all there is to it. Could I keep the gimbal camera installed and mount the AL250 to the back of the unit? Why not? I had already learned that two Lume Cubes and a Rugo light could be mounted back there, and with a little playing around, they will not cause balance problems. As before, I mounted a sticky GoPro mount to the back "Link" area under the Solo. I wouldn't mess with too many extension arms for this light. Just get a thumbscrew in there and tighten it down where you want it.

The Fiilex AL250 emits an intensity equivalent to a 200–watt bulb yet only draws 30 watts of power.

Curiously, for a collaboration with 3DR, there is no app integration of any kind. I would have expected remote access for on/off purposes and to conserve battery life. You might have read about the tethered solution for flying this light, but this tether is only for aircraft battery at this time. In the future, the AL250 might have an option to run off this tethered battery, but it is not yet available. The unit's lithium-ion battery will last 25 minutes on a single charge. The AL250 sells for $349.00.

The 3DR Solo/Fiilex AL250 configuration is ready to take flight from a Hoodman Launch Pad.

MAKE SURE THAT THE LIGHT IS FARTHER OFF THE GROUND THAN THE LANDING FEET, POSITION THE ANGLE OF THE LIGHT IN THE DESIRED BEAM DIRECTION, AND TIGHTEN THE THUMBSCREW. THAT'S ALL THERE IS TO IT.

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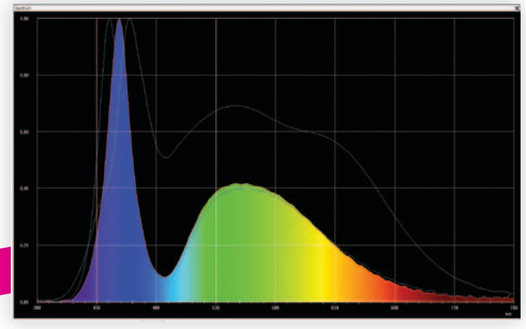
Scientific Testing

Thanks to Brent Siebenaler, my new friend at Fiilex, we were able to measure each light's qualities, such as color temperature, spectrum, color rendition index (CRI), and lux (intensity). We measured each light source in a controlled setting: a dark conference room. We set all three lights at full-intensity settings at a distance of 9 feet, looking straight down the barrel of the source. This controlled test most likely will not match your nighttime flight parameters. This was strictly to compare the light qualities of each source for photographic purposes.

The Illuminating Engineering Society's Greg Moreland (morelandlighting.com), one of the world's foremost authorities on color quality, enhanced the charts and took the readings further using his proprietary software. Greg explained, "If you don't light it, you don't see it," meaning weak or nonexistent color readings will result in similar photographic results.

By my estimation, there are two types of commercial drone operators: those with a filmmaking background discovering a new type of aerial photography and aviators who are coming into the filmmaking world. For the latter group, a basic understanding of light quality would help them make better decisions on product purchases. Photographically, they will learn about the makeup of a light and how it pertains to imaging. For the purposes of this article, we'll concentrate on two charts: the CRI and the full spectrum comparison. The purpose of these charts is to compare light qualities so that you can make your own decisions photographically or to use them solely for recreation.



The base–shaded areas represent the outline of FoxFury Rugo Lights, the green outline represents Lume Cubes, and the red outline is the Fiilex AL250.

Full Spectrum

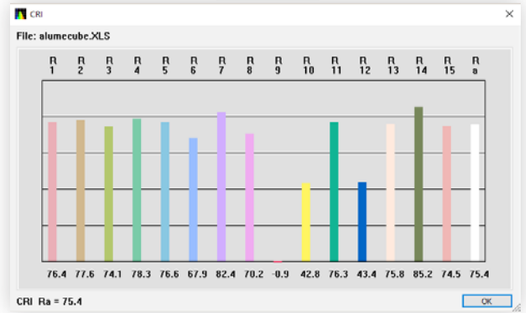
This chart shows the light colors produced by a source. The spectrum is made up of 400 individual colors—hence, the horizontal numbered scale at the bottom, the points at which the human eye sees light. The base-shaded areas represent the outline of the FoxFury Rugo light; the green outline represents Lume Cubes, and the red outline is the Fiilex AL250. You have to imagine the nonshaded outlines as individual shaded charts to appreciate the comparisons. Because all three of these lights are daylight balanced, ranging from 5600K to 7400K, there are three spikes on the blue end of the spectrum. Please consult each manufacturer's website for exact specifications regarding its product.

Color Rendition Index (CRI)

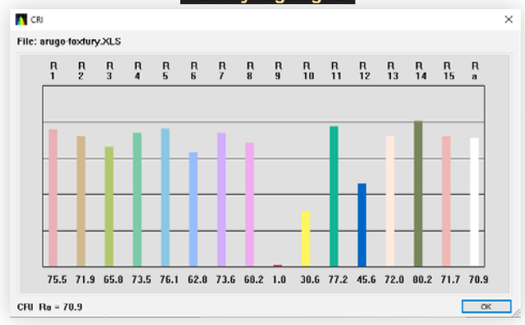
Color rendition, as described by topbulb.com, is "how a light source makes the color of an object appear to human eyes and how well subtle variations in color shades are revealed." The scale on a color rendition chart is marked from 0 to 100. The higher the CRI, the more accurately that color will be rendered. From the left, the R1 through R8 values represent the pastels or combined shades of all colors. R9 through R15 bring in the saturated colors, different flesh tones, and foliage.

The following are individual CRI charts for the three lights reviewed. Draw your own conclusions. You might find that one product is better suited for recreational purposes over photographic ones.

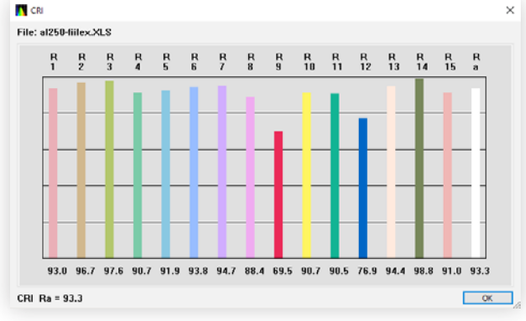
Lume Cube



FoxFury Rugo Lights



Fiilex AL250



Note: *In no way does the author or* RotorDrone *advocate flying UAVs at night. It is up to the individual UAV pilot to read and understand the official FAA rules and regulations that pertain to flying UAVs after sundown.*