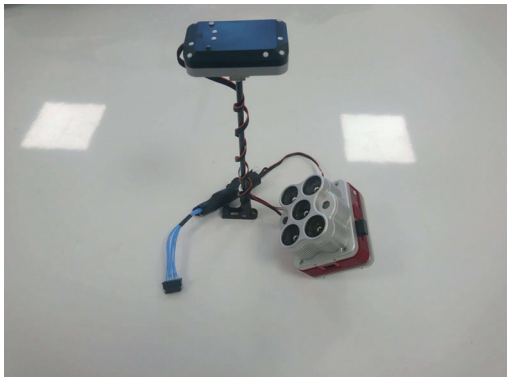
ALBATROZ ENGENHARIA NEWS

How Do Multispectral Cameras Work?

If you ever heard of multispectral cameras or imagery, you probably heard it associated with drones. There has been a lot of progress in multispectral imagery and its usage in agriculture in recent years, where drones now play a key role, due to their rapid coverage for a big area. But what does multispectral mean? What is exactly a multispectral camera? Keep reading to find out.



multispectral camera

Spectrum, Light, Colors

Well if you want to understand the basics about this subject, you have to know a little about electromagnetic radiation, electromagnetic spectrum, light, and spectral lines.

Visible light, for example, works in the spectrum of frequencies of 400–790 THz, meaning that our eyes are "equipped" to see electromagnetic radiation inside these frequencies - every color and shape we are able to see are thanks to these electromagnetic waves.

This range of frequencies between 400 THz and 790 THz is called the visible spectrum.

Normal cameras

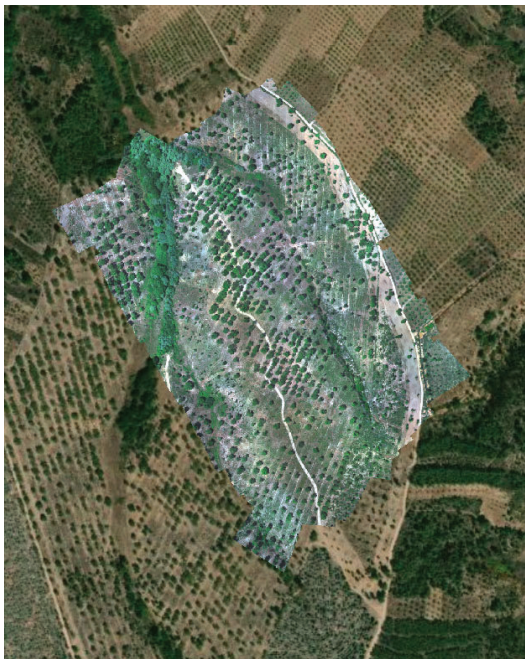
A normal camera, called RBG camera, like the ones we have in our mobile phones, "catches" specific narrow ranges of frequencies called monochromatic light: red, green and blue. Using a process called interpolation, the camera computes the actual color of each pixel by combining the color it captured directly through its own filter with the other two colors captured by the pixels around it. If you really want to have a quick lesson about RGB cameras, you can read this article.
Basically, the camera electronics and software is able to combine the red, green, and blue light bands its sensors collect, to provide an image with all colors and shapes we can see.

Actually... the sensors do not get an image with blue pixels. What it collects is the reflectance or **brightness** of light in that frequency. In an image collected by the blue sensor, you will only get a greyscale image, where black represents no blue and white represents really a LOT of blue reflected. It's by processing the information of brightness of the same picture in the three colors that you will get the "real picture" (pun intended). RGB (red, green, and blue) is also knowns as the additive color system because when the three colors are combined in equal amounts, they form white.

So... How do multispectral cameras work?

Multispectral cameras work by imaging different wavelengths of light. Multispectral cameras usually have 5 dedicated camera sensors, each with a special optical filter that allows only a narrow range of light wavelengths to be captured by that sensor. After processing, the output of the camera data is a set of images where the value of each pixel is equal to the reflectance percentage of light for that particular wavelength.

These sets of images are then "glued" together to create geographically accurate mosaics, with multiple layers for each wavelength. The principle is the same as with the RGB cameras, however, these cameras give the images separately for post-processing, while our mobile cameras give the image already processed and in colors.



orthophoto: merging the multispectral camera bands

Multispectral Camera Applications

Mathematically combining these layers gives vegetation indices. There are many vegetation indices that measure the different characteristics of a plant.

Some indices, for example, are useful for measuring chlorophyll in plant leaves. Other indices can be used to calculate nitrogen content. Other indices give indications of water stress. One popular index is the Normalized Differential Vegetation Index (NDVI), created by a formula containing the reflectance from red and NIR (Near InfraRed) light.

These indices give agriculture and forestry stakeholders an insight into their

vegetation cultures state that they didn't have before - and all with only a few hours of surveying. That allows to implement several optimization practices in vegetation exploitation, not possible before the existence of multispectral cameras.

What is Albatroz Engenharia Doing?

We are attempting to combine this sensor with other sensors, namely LiDAR, in order to identify tree species automatically. Every sensor has its limitations and strengths, and by combining more than one solution, we cover the weaknesses of one sensor with the other.

Data is then obtained and post-processed through various algorithms in order to provide the most accurate identification possible, always having in mind an optimization of costs. Our goal is always to maximize efficiency: achieve the quality and results expected by our customers with the lowest level of resources possible.

For further information contact our commercial department: comercial@albatroz-eng.com