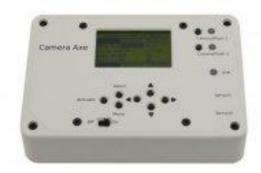# Camera Triggering

One of the challenges at the Workshop on Thursday was to capture a model car as it jumped over a gap. Now of course you can do it the hard way by setting the camera up on a tripod with a flash and a remote release and try and manually capture that precise moment as the car is in the air. In fact to do that with the car is not that hard as it is moving comparatively slowly. Try capturing a water droplet as it hits a pool of water or even better just after when you get the spike and that is a different story. An even bigger challenge is getting a lightning strike during the day time.

Fortunately it is possible to employ some technology to help out. Camera triggers have been around for many years and come in various shapes and sizes and of course prices to match. If you want to capture lightning strikes during the daytime for example, you can purchase a dedicated trigger to do the job with prices starting around $150. Incidentally, you don't need a trigger for photographing lightning at night. Just simply set the camera to Bulb with a suitable aperture, say f/11 and using a remote release hold the shutter open and count to 30 and release the shutter. Check to see how well exposed the image is. If it is overexposed, either reduce the count to say 20 or go for a smaller aperture and try again. Remember if you decrease the aperture e.g. making it smaller by one stop, the time is doubled to get the same exposure. If it is under exposed then do the opposite. Once you have got a reasonable exposure just keep holding the shutter open and counting until you see a lightning strike or you get to 30 or whatever number you settled on, whichever comes first and the release the shutter. You should then have a nicely exposed lightning strike. Obviously you can do this at night because it is generally dark, although do watch for a bright moon. If the lightning is appearing over a town or city with lots of lights then you will have to adjust your count or aperture, or both accordingly.

OK then back to the plot. In the case of the model cars on the track we used a CameraAxe trigger. CameraAxe is a cost effective triggering system that was developed by an enthusiast for enthusiasts, which means that it is affordable and has lots of options.

The unit is powered by an Arduino board, which means that it can be programmed relatively easy and you are not tied to the developer or the retailer when it comes to updating the software.

The unit has two sensor ports and two outputs. The sensors can be active infrared, passive infrared, laser, visible light, sound, movement or just simple old fashioned mechanical contacts. If you are electrically inclined and can use a soldering iron you can even build your own sensors. The circuit information on how to do this is made available by the developer. Each output port can control a Camera or a Flash. When you purchase the Camera Axe you will logically buy some sensors depending on what you want to do. As regards triggering the camera you can purchase the appropriate remote control cable for the type and model of camera that you have. There are currently variants for Nikon, Canon, Sony and Olympus. There is a flash hot shoe adapter similar to that on a camera into which a flash gun can be put. Using the Camera Axe you can trigger the flash gun independently of the camera, which is important as there are times when you want the flash to fire after the camera shutter has opened.

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Version 5 of the Camera Axe is the current version and it is powered by an internal lithium battery and recharged via a USB port. The previous model used AA cells. The unit can be externally powered via the USB port if it is going to be used for a long time such as an intervalometer.

So how was the system setup for the cars?

An infrared emitter and receiver were placed either sides of the track and aligned with each other and connected to Sensor 1 on the Camera Axe. A flash gun was connected to one of the outputs.

The Camera Axe could then read the strength of the infrared signal and the trigger point set. The actual value of the infrared was something like 40. The trigger point was then set at 30 and set to a 'low' trigger. When the infrared beam was interrupted by the car passing, the signal level dropped and when it passed 30 the Camera Axe triggered. The Camera Axe provides the ability to program in a delay between the Sensor Input seeing an event, in our case the car passing, and when we want the flash to fire. This was something like 200mS (0.2 seconds) for the cars. If the flash was to fire too early it is a simple matter to increase the delay to make it fire later. To make the flash fire sooner the delay would be decreased. With the cars the time was not always the same because it depended on how fast the cars were being driven but eventually the driver got the hang of it.

The beauty of the system is that it takes most of the guesswork out of triggering the flash, it is less frustrating and allows more time to concentrate on the shot. In the case of the camera, this was set to bulb and the shutter manually opened as the car approached the ramp and then closed as soon as it had landed, or crashed! By setting the camera to a small aperture and placing the flash close to the point where the car would be in the air it was possible to exclude a lot of the ambient lighting in the room.

(*Images compliments of Kevin Williams*)

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Capturing Water Droplets.

The same principle used for the cars is applied to capturing water droplets. One advantage with water is that gravity does not change and so it is much more consistent. Once the rig has been setup you can merely change the delay to get the droplet at whatever point you want.

When I played with water I used some small tube to which I attached a syringe full of water. This allowed me to gently press the syringe and produce the water droplet. The end of the tube was poked through some plastic trunking beneath which was the sensor. This was set about 40cm above the bowl of water that the droplet would hit. Obviously the higher the droplet falls the bigger the splash. As soon as the sensor detected the water droplet passing the camera shutter was opened and then after a delay the flash was fired.

Once the rig had been set up a droplet of water can be photographed with amazing consistency at whatever point in it fall or the splash that you want.

It is possible to purchase an automatic rig that connected to the Camera Axe specifically for water whereby the size of the water droplet can be determined by the Camera Axe and also the frequency of the droplets. Using this it is possible to get the droplets to collide making for even more interesting images.

Daytime Lightning.

The challenge with daytime lightning is that the camera has to fire as the lightning occurs. You cannot use the same technique as for night time lightning using the bulb and delay method as the image will be totally blown out.

There is a software update that adds Lightning to the menu on the Camera Axe that can be used in conjunction with the light sensor that solves the daytime lightning issue. When set to the Lightning menu and the 'Activate' button pressed the Camera Axe will read the ambient light level and set that as the threshold. If it sees a brighter light e.g. lightning, it will provide an output to the camera. The Camera Axe will periodically read the ambient level and re-adjust the threshold point. There is also a pre-focus option to ensure minimum lag between the sensor seeing the change in light level and the camera being triggered. If you did not have this automatic reading of the ambient light level then you would very likely to get false triggers as the ambient light level can vary dramatically during a thunderstorm. Before the Lightning menu was introduced I did some Lightning capture and had to

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continually re-adjust the threshold point to stop false triggers. I emailed the developer with the idea of the auto ambient level reading and the result was the Lightning menu.

Other Things to Capture.

Once you have the Camera Axe the uses to which it can be put are only limited by the imagination. Using a microphone connected to an input allows the Camera to be triggered by a sound event, such as a balloon bursting. On the theme of destroying things there is a projectile sensor available that allows the Camera Axe to calculate the speed of a projectile, such as an airgun pellet and then by entering the distance to the target will fire the flash at the appropriate time when the pellet hits it. Old Christmas tree baubles and apples come to mind although they do make a mess and best done in the garage!

Connecting a passive infrared sensor such as used in security systems to the Camera Axe allows the capturing of the more elusive creatures such as hedgehogs etc. This obviously works both during the daytime and at night.

Where to get a Camera Axe

I first purchased a Camera Axe directly from the USA and had to wait some three weeks for it to arrive and had the sweat of whether or not I would be hit with a customs charge. The good news now is that Camera Axe can now be purchased in the UK along with any sensors and remote control cables that are required.

The US website is:

www.cameraaxe.com

Here you will find just about everything you need to know and some examples of what can be achieved along with the documentation on how to build your own sensors.

The UK agent is Proto-Pic:

http://proto-pic.co.uk/categories/camera-axe.html

The price for the Camera Axe ready built is £163.93. The remote control cables are £17.64 for the cameras and the Flash Hot Shoe is £22.16. The simple sensors are also £17.64 although as I have indicated these can be made yourself.

If anyone purchases a Camera Axe and wants help building sensors, just let me know. The component cost is very low.

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