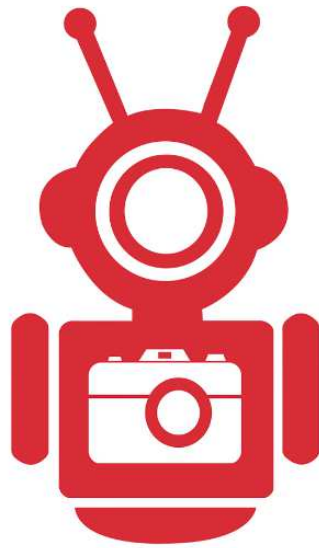# Fundamentals of Liquid Drop Photography

by
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Drop Robo

Water Drop Photography Kit

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I have always been very keen to explore the unseen world, be it Macro Photography or the way Liquid drop structures are formed after the collision. If you are interested to start learning and exploring the **Secrets of Liquid Drop Photography**, this article is for you.

This blog article is an attempt to **help beginners** who are looking to learn the **key aspects** of Liquid Drop Photography.
Before jumping into photography let's first understand **how does the liquid drop structure form?**

For a basic level of understanding, when a liquid drop falls into a water container, it creates a crown on the water surface and then crater is formed which later results into creation of water pillar. The water pillar is known as Worthington jet. Liquid shapes like mushroom, umbrella etc are formed when two successive drops are released in a timely manner such that the water pillar created by first drop collides with the succeeding drop.
Here in all my examples, drops are released by a solenoid dropper using an electronic device called **DropRobo**. DropRobo is an easy device to control solenoid, camera, flash, drop sizes and timers conveniently with the help of an android phone app.

What equipments are needed for Liquid Drop Photography?

Liquid Drop Photography comes under the genre called **High Speed Photography**. High Speed Photography is taking pictures of actions which are happening in a fraction of time. Typically, in case of Liquid Drop Photography the shutter speed needed is higher than 1/10000 seconds. This is quite a high shutter speed which is normally not achievable with ordinary DSLR with desired level of light exposure. **There comes the role of flashes**, in Liquid Drop Photography flashes are used to freeze the action. This is very fundamental concept of High Speed Photography. Flashes can freeze the action by setting them up on low power value in manual mode, generally around 1/64 is sufficient. You can go up to 1/32 in case there is more light needed, but increasing the flash power beyond 1/32 is not recommended. Also, you can get stunning shots with single flash, but it is more fun with 3-4 flashes.

Any **camera** which allows **manual mode** and or Bulb mode would be sufficient enough for Liquid Drop Photography. Generally any DSLR camera will work. A macro lens is recommended for liquid drop

photography but it is not mandatory, zoom lenses between 100-400 mm which can take a nice close up with details will also work. Try avoiding extension tubes as they are generally needed to be placed very close to the subjects, which can be vulnerable to liquid splashes.

At least one **tripod** is needed to mount the camera for easy and stable control. Mini tripods can be used to mount flashes. There is no rule, if you have any alternatives which can achieve the same, go ahead and try that. Since this is macro world, slightest change in either the lens or flash angles may vary the image exposure considerably.

You'll of course need DropRobo Water Drop Photography kit setup or any other similar kit. You would also need **good backdrop arrangements**. This can be achieved in many ways depending upon your choices. Simplest of them are having a black backdrop or having a translucent acrylic sheet as background as well as a nice diffused light source.

How to setup the whole arrangements?

Flash placements

There are numerous ways you can place the flashes. The two ways I like most are:

A. **Controlled background**

Keep one flash behind the drop area and diffuse it with Plexiglas. This flash will not only provide good light but will also act as a white background. You may add color gels or papers to change the background color.

Put another flash on the front side either directly to the drop or use a white sheet to get reflected light on to the drop area.


Img01: Controlled background

Use a dark black backdrop and keep it as far as possible from the drop area. Put a single flash facing towards the drop area but keep it between the drop area and the background. Make sure drops are not opaque otherwise there will be underexposed drops facing the camera.

Put another flash on the front side either directly to the drop or use a white sheet to get reflected light on to the drop area. Image below shows two flashes on the front but one is also sufficient. You may use reflector on the other side.
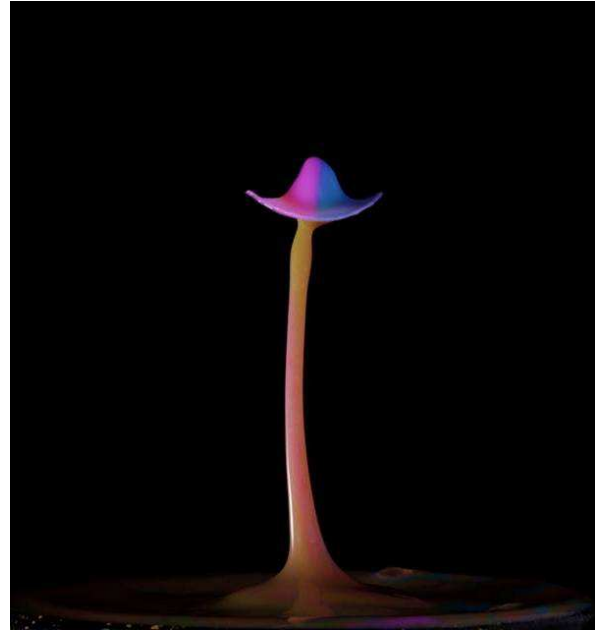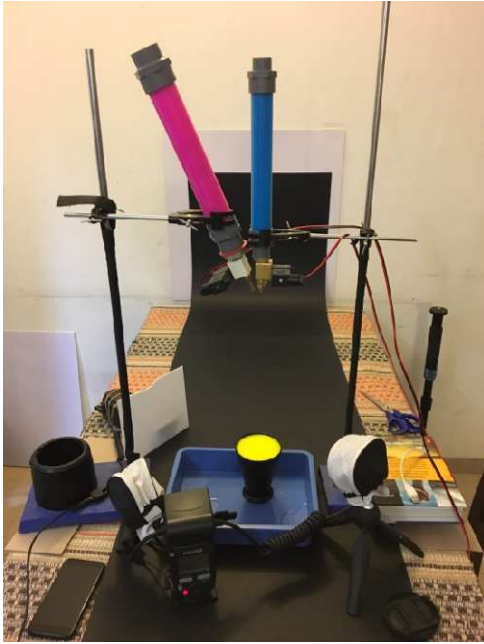
Img02: Black Background

Camera settings

Mostly the aperture would be around f/18 and ISO between 100 and 400. This setting is just like any other macro photography settings.

The shutter speed doesn't matter as the motion will be freeze by flash. If you use DropRobo, the camera mode should ideally be Bulb mode with shutter speed around 300-500 milliseconds which will be set on Android app only. This is basically for a long exposure.

Setting up Dropper & Water Basin

Keep the dropper at around 1 foot above the water basin. Adjust the height until you get a good Worthington jet. Adjusting height and drop size may go hand in hand to get the best height of the jet.

Drop size 30 ms is generally good to try with, which may go up to 60 ms. Ideal Drop size for a specific targeted shape would come by practice.

The water basin could be anything which can store water to at least 1 to 2 inches. Normally this depth is sufficient as falling water drop may not penetrate more than 2 inches. Long tray of around 50-100 cm is recommended for reflection shots, longer the better. Width of tray may be around 25 cm.

If you are a serious photographer, white, black and transparent Plexiglas trays are recommended.

Focusing

Like any other macro photography it is highly important to set proper focus. The easiest is to use an object and keep it on a scale or a board where the drop is falling as shown in the image below. First focus normally then switch to live view mode to further fine tune by manual focus.
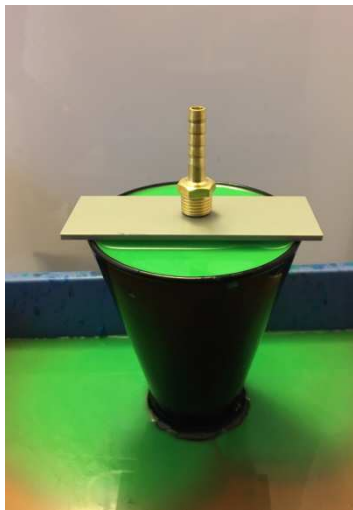
Img03: Focusing ad

Preparing the liquid

Before preparing any solution the best is to try taking shots with plain water and gain initial understanding of the DropRobo system. Once basics are clear then only jump on to preparing viscous water solution as explained below-

1. Make around a glass of clean water and heat it in the container.

2. Mix the guar gum or xanthan gum slowly bit by bit and stir very well to dissolve so that it doesn't form any lump. Little bit of lump formation is normal as it will be removed by strainer cloth later. Do not mix a lot of gum; generally half a tea spoon is sufficient. Mix it such that you see some stickiness but it should have a free flow like edible oil.

3. Once dissolved completely strain it with thin cloth or non sticky strainer and collect the liquid in a different container. Mix a bit of color; do not make it too dark. After that you may

optionally add ¼ or ½ glass milk into it. Milk will help making the liquid translucent which will help is reducing harsh lights.

4. Fill this liquid into the reservoir. Put other color into the plain water container which you'll be putting under the solenoid valve. Some people also like putting a bit of detergent into the receiver container. You may also try it or may try with or same liquid preparation similar to that of solenoid reservoir but of different color.

So how to shoot?

By now you have fair idea about the setup.

Dropper will release the drops for collision, the camera shutter would remain open for a particular time period in bulb mode, flash will be fired exactly at the time of collision to freeze the moment. All these actions will be timed by the photographer using droprobo android app.

Obviously the question would arise how exactly the shot is configured and taken. We'll not go into the nitty-gritty of droprobo specific setup guide.

Here we explain it step by step. Our simple objective is to capture the collision.

Getting the first drop right

First of all, do not connect Camera and Flash, only try releasing the drops with plain water. The first drop should be good enough to create a reasonably high Worthington jet.
Setting a drop size of 30 milliseconds and height of the dropper to 12 inches would be a good start. Set the same, trigger it and observe the fall. If the fall is vertical and height of Worthington jet is around 2 inches then you are good to go. If the height of the jet is less, increase the dropper height and or size of the drop to get a nice tall jet.

Setting up the Second drop

Once you are happy with the first drop, move on to setting up the second drop i.e. releasing the first drop as well releasing another drop soon after the first drop. Set the drop size to 30-40 milliseconds, and a time delay of around 180-200 milliseconds. Observe it, if the collision is happening at the peak of the Worthington jet you are good to go. If not, try adjusting the delay. These parameters are to give reasonable idea for timer values. it may vary in your case depending upon dropper height and depth of the water basin you are using.

Please note whatever drop device you use the main principle would remain the same.

Setting the Flash timer

Once you start getting the collision, connect the Camera and flash. Set appropriate timer value for the flash, generally it is between 400 to 500 milliseconds. Try out the same and observe to adjust up or down further.

Here the camera shutter in bulb mode will remain open from the time drop is released until the flash is fired. This is how you get the shot.

Conclusion

Keep experimenting with different drop sizes, drop numbers and let your creativity find its own way. Try focusing more on things which you can control best, like lens angle, flash angle, amount of light, freezing the action and background style. Let the drop device control the rest for you.

Azad is an Engineering Graduate and Photography is his passion. Currently he runs a software development and electronics business in Pune. He also likes Street and Macro photography. He is one of the leading photographers of Water Drop Photography space in India. He has worked in Investment Banking Technology for 17 years for companies like Capgemini, JP Morgan and Barclays Technology.