

Drop Robo



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DropRobo Android App

Last updated May 2021
www.droprobo.com
 for DropRobo Plus

DropRobo App GUIDE

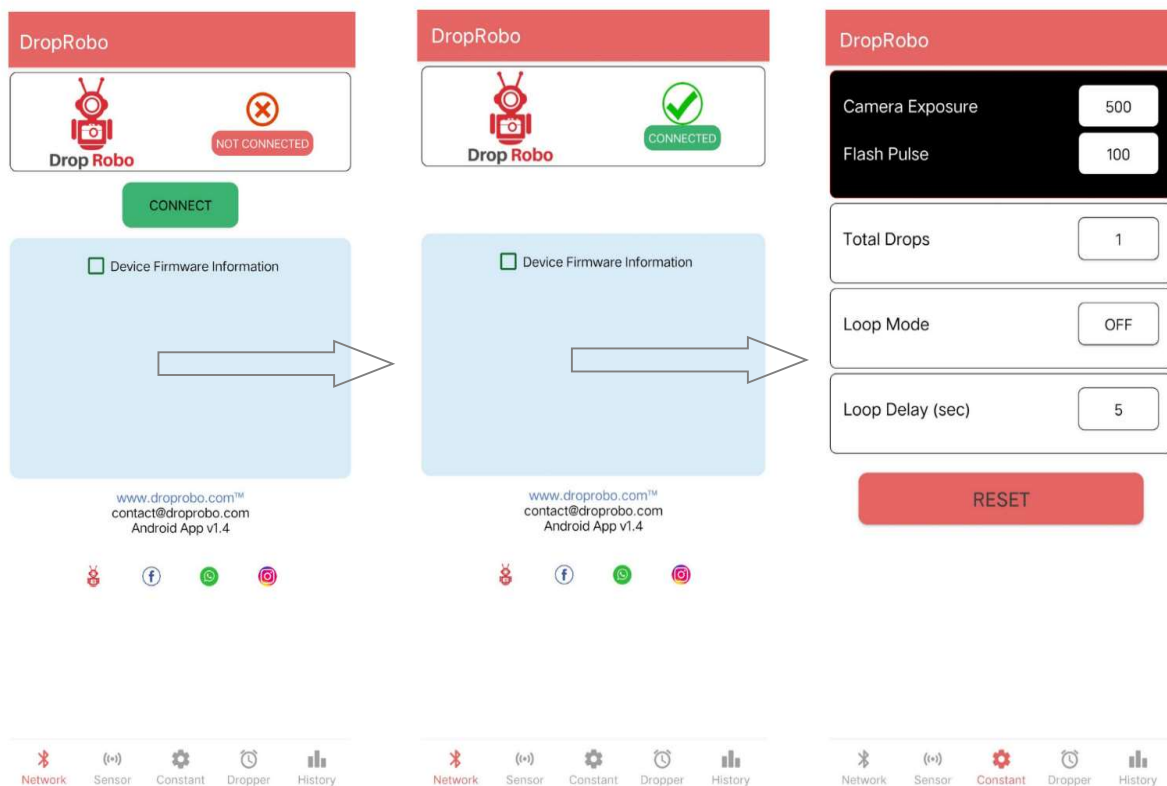


Figure 1 after pairing Launch the App and Just Press Connect Button

DropRobo Android App

Step 0 - How to Install the app?

To install the app go to Google Play Store and search for DropRobo, search results will show “DropRobo”, click on it and install it. Alternatively you can directly click on the link below

[DropRobo Google Play Store](#)

Step – 1 Pair the Phone with DropRobo

How to pair DropRobo with Phone?

- a. Power on the DropRobo electronic device. **Observe** the LED colour on the DropRobo device. It **should be red**.
- b. Pair it with “DropRobo” device. Follow below instructions:
 1. **Turn on the Bluetooth on phone by going to “Settings”**
 2. On your phone look for new devices listed under “Available Devices” > “Rarely Used Devices”, if you do not see any, click on “Scan” or refresh. You may notice some devices are listed and one of them should be “DropRobo”, tap on it to pair with your phone, no password will be asked. If you get a pop up which says share your contacts click okay without ticking the checkbox. **It should pair now and LED should blink to Blue.**
 3. **You are now ready to use DropRobo app.**
 4. Later, as soon as the app is launched you will see on the connection status on the app screen. If it is not connected, click on “Connect” button.

Note: Every time you launch the app on phone, make sure –

1. **Turn on the DropRobo device first**
2. **Turn on the Bluetooth of your phone**

DropRobo Android App

Understanding The App Screens

1- “Constants” Tab Screen

This screen should be the first activity

[1]: Put here the shutter speed of the camera. Generally 300 milliseconds works fine. But mostly keep it 500

[2]: This is exposure duration of the flash.
This is not used, so leave it same 50 or make it 100 as if it works well with your specific flash.

[3]: This is total numbers of drops you want to setup.

[4]: Turn Loop mode on if you want to take nonstop clicks one after the other, else keep it off for one shot at a time.

[5]: When you turn loop mode on, you can also set delay between the clicks. This is generally the time required to settle down water on receiver vessel. Use only when you want to take automatically series of photos. This value is used only when Loop mode is kept on.

2- “Dropper” Tab Screen

[Start Button]: Press start button when you are ready for shots and want to send command to DropRobo device.

[Save Button]: Press save button to save data of this screen. Saved data can be referred later under history tab.

[Stop Button]: Press stop button to terminate, use this to stop the draining or to exit from loop mode

[Drain]: Buttons to drain off the solenoid valves to drain the solenoid tube, generally used to empty the tubes

[Flash-1 & 2]: This row is Flash trigger time

[Camera]: This row is Shutter trigger timer. Its value changes automatically when you fill flash field. Can also be modified but normally leave it to default.

Ex: The value X would mean camera/flash will be triggered after X milliseconds you press start.

The triangular red buttons on all screens are arrows representing increment (upward) or decrement (downward). By tapping on it the direction can be changed. These controls are activated only when user selects loop mode ON. Arrow facing downwards means the time entered in the field to the right will be decremented from the main value to the left in every subsequent loop shots.

[Valve]: The valve Id is to be selected to release drops from that particular valve, tap on it to change the Id

[Timer]: After these milliseconds the drop will be released

[Size]: Size of the drop in milliseconds (i.e. valve will remain open for these many milliseconds)

DropRobo Android App

3- “Sensor” Tab Screen

Useful only for users who have bought sensors from us or have their own sensors. Please note this has nothing to do with water droplet photography. This is an independent functionality to try other high speed photography.

Sound-Light-Analog

[Sensor Types]: There are three categories of the sensors. The first category is of Analog Sensors (example Sound Sensor, Light Sensors, or any other sensors which sends Analog values). The sensor would send a numerical reading to the droprobo device

[Threshold]: This is the sensor reading at which you want photograph to be taken. User enters a value here.

[Dark Room]: select this option if you want Camera shutter to open immediately after activating the sensor

[Flash Delay]: Put time delay in milliseconds in case you want to delay the flash. Example: The value 100 would mean that flash will be fired after 100 milliseconds of the sensor meets the threshold value.

[Cam Timer]: Time at which camera shutter will be opened

[Sensor Value Display]: Display area to display sensor readings. “Last Read” may always be look like zero in case of Sound Sensor and silent room, even if you make sound for short duration, because it read continuously and displays the values which are changing fast. Any constant continuous sound will display the Last Read value more meaningfully. Last read in case of Light Sensor would be visible constantly fluctuating slightly if it is not pitch dark.

[Activate Button]: Activates the sensor and starts the High Speed Photo session.

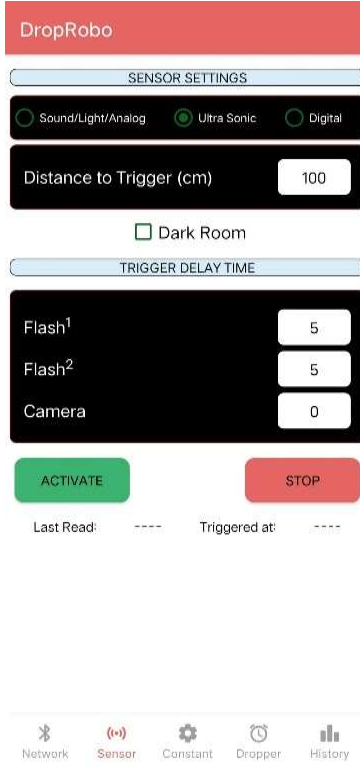
[Stop Button]: Terminates the sensor activation and comes back to normal mode.

Digital Sensor

This is when you want to use any Digital Sensor, the one which reads only ON or OFF, no numerical values.

[Digital High/Low]: User has to select “Digital High” or “Digital Low” as photography condition for the photography event to take place.

DropRobo Android App



DropRobo

SENSOR SETTINGS

☐ Sound/Light/Analog
 ☒ Ultra Sonic
 ☐ Digital

Distance to Trigger (cm)

☐ Dark Room

TRIGGER DELAY TIME

Flash¹

Flash²

Camera

Last Read: ---- Triggered at: ----

Network Sensor Constant Dropper History

DropRobo

Historical Drop Data

Sr	Drop	Flash ¹	Flash ²	TimeStamp
1	3	450	450	17:15 20 Apr

Click on rows for detail

Network Sensor Constant Dropper History

4- Ultra Sonic/Sonar/Distance Sensor (Added June 2021 Onwards)

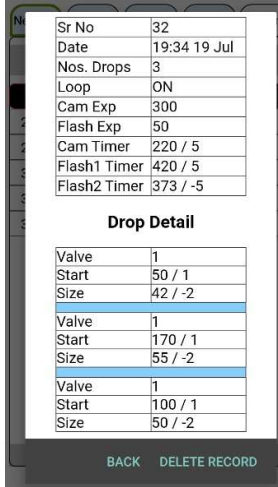
Sensor would read the distance of an obstacle which comes on its way and would trigger the Flash and Camera.

"Distance to trigger" would be entered by the user. If the value entered is 100 that would mean the flash and camera would trigger only when the distance of the obstacle is less than 100 cm. Value can range between 20cm to 250cm but we recommend to keep it around 100 cm.

5- "History" Tab Screen

History tab is to view previously saved drop setting values.

When you launch the app the last saved record will be populated under dropper section. The main screen displays the high level information, on click of the row, the detailed data will be shown

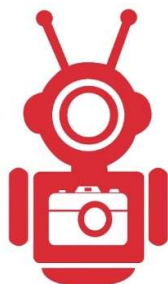


Sr No	32
Date	19:34 19 Jul
Nos. Drops	3
Loop	ON
Cam Exp	300
Flash Exp	50
Cam Timer	220 / 5
Flash1 Timer	420 / 5
Flash2 Timer	373 / -5

Drop Detail

Valve	1
Start	50 / 1
Size	42 / -2
Valve	1
Start	170 / 1
Size	55 / -2
Valve	1
Start	100 / 1
Size	50 / -2

DROPROBO SETUP GUIDE



Drop Robo^{PLUS}
Water Drop Photography Kit



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v1.0

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Where to connect Camera, Flash, Sensor and Solenoids?

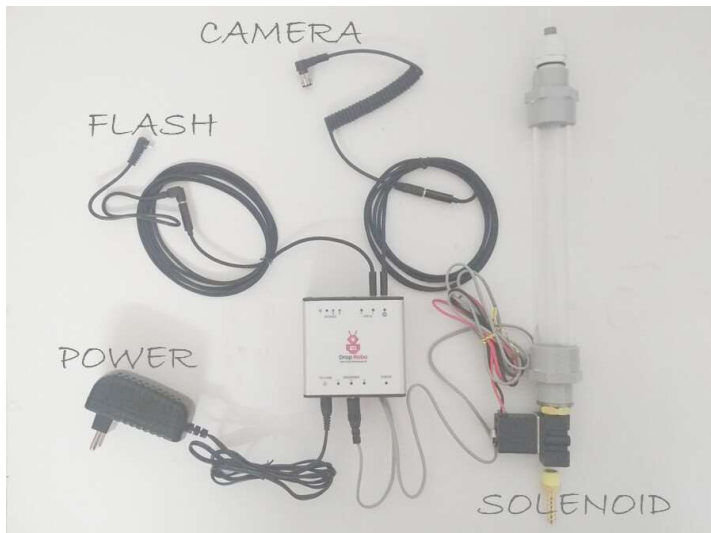


Fig 1

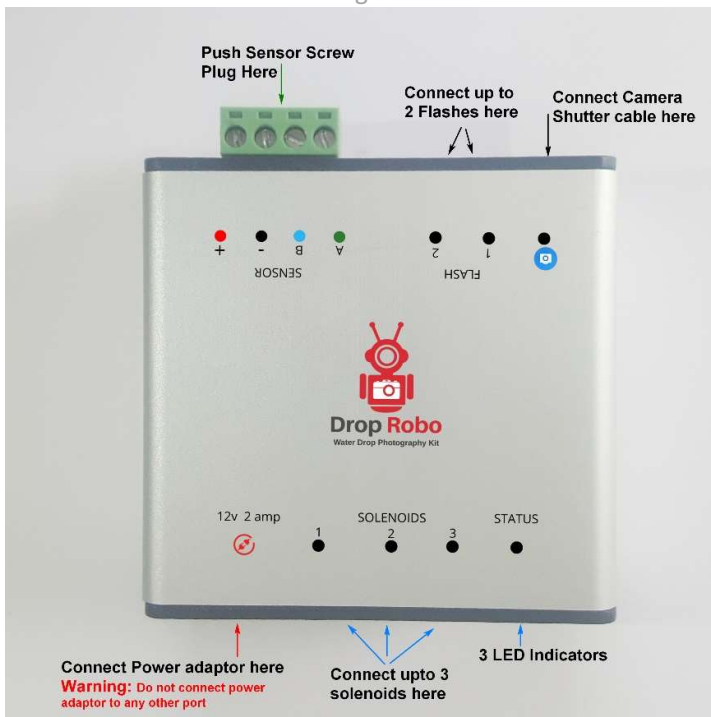


Fig 2

DropRobo Device

- It is an aluminium body of size 8x7x4 cm.

Water Reservoir

- It is a tube of around 8 inch in height and 32mm in diameter. It has removable siphon cap. Bottom end of the tube has an electronic solenoid valve which controls the drops.
- Solenoid coil, which is generally black in colour, comes with pre-attached DC cable. Mount the coil on to the solenoid valve with the help of a nut provided with it.
- Solenoid Valve has a nozzle which releases the drops and also has a brass adaptor which connects the tube.

Single Stand (Lab Stand only)

It has 4 parts to be assembled by the user:

- Rectangular metal Base
- Around 24 inch long metal rod
- Four finger metal clamp
- Small metal clamp

Connectors/Adaptors

- 12v 2amp AC to DC Adaptor
- Camera shutter release cable with 3.5mm adaptor
- Flash PC Sync cable (If included by the user)
- Flash Adaptor/Splitter if user has included it in the order. This is used for joining 2 flashes on single flash connection point.

Sensor

- It is included if user includes it in the order. Please note its connector may change time to time based on design improvements. Image may vary slightly.

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Camera Setup & Focus

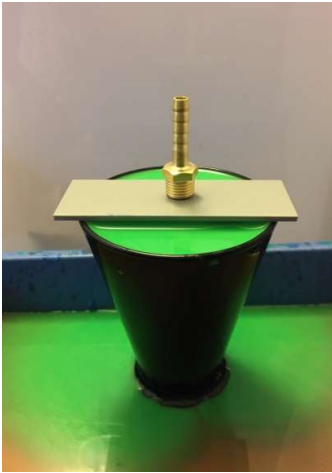


Fig 3

Setting up DropRobo Device

Assembling the Lab Stand



Fig 4

Set camera to Bulb mode, aperture to f/11 to f/20, set ISO 100 to 400.

How to Focus

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. Do not forget to switch back to normal view from the live view mode and always shoot with manual focus mode only.

[1]: Connect the power adaptor to the main device socket labelled as "12 v DC", do not turn it on at this stage.

[2]: Connect the Solenoid valve to any of the solenoid sockets labelled as 1, 2 or 3 on the box.

[3]: Connect the camera shutter release cable to the point labelled as "Camera" on the main device. Connect the other end (the end which is as per your camera model) to the camera. When you connect or disconnect this cable make sure camera is NOT ON.

[4]: Connect the Flash PC Sync cable to the point labelled as "Flash 1" on the box. You may alternatively connect an adaptor in case using 2 flashes. Connect the other end of the cable to the flash. Make sure the flash is not on during this process. You may need flash cold shoe in case your flash does not have PC Sync cable.

[5]: Turn on the main power and setup Bluetooth as explained in app guide.

[1]: Keep the rectangular base on the even floor; it is ideal to have a rubber matt on the floor. Tighten the stand rod to the thread hole provided in the metal base. Use lever attached at the bottom of the rod to tighten it, avoid over tightening as it may damage the thread. Tighten the one end of the small boss head clamp to the rod, mount four finger clamp to the other side of the small boss head clamp as shown in the fig. Do not overpower to avoid any damages. Four finger clamp is now ready to hold the reservoir. Keep it approximately 20 inches above the base, this can be re-adjusted later. Now keep the assembled stand on a strong table.

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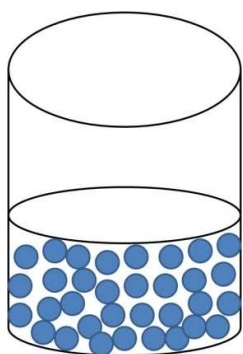
10

Assembling The Single Reservoir



Fig 5

Preparing the Fluid



[1]: Dropper is of around 8 inch long and diameter of 32mm tube. It has removable cap with siphon attached on the top. Picture here may vary as we upgrade time to time. The top cap can be removed by rotating it anticlockwise. Water should be filled from the top after removing the cap. Siphon is used for consistent pressure for all water levels, but it is up to the user to use it or not. **Most people prefer shooting without the siphon as it is easy to refill the tube again and again, and good results can still be achieved.**

[2]: Bottom end of the tube has a solenoid valve from where the drops will fall. Users will have to mount the black coil on to the valve with the help of a small plastic screw supplied along with the coil. Black coil comes with the cable attached to it.

[3]: Once tube is assembled, mount it in perfectly **straight** position on the stand. Depending upon the clamp size, put the clamp to the blue adaptor as shown in the image or to the upper part of the blue bottom. Avoid putting the clamp to the transparent area as it may break.

Before preparing any solution try taking shots with plain water to gain initial understanding. Once basics are clear then only switch to viscous fluid as explained below-

[1]: Take around 500ml of clean water and heat it up in a container.

[2]: When water is hot, take around half tea spoon of xanthan gum, mix it slowly bit by bit and stir very well so that it doesn't form so much of lumps. Little bit of lump formation is normal as it will be removed by strainer cloth later but do not mix a lot of gum.

[3]: Once xanthan is dissolved completely, strain it with washable nylon tea strainer or with a thin cloth. After straining mix more water to it such that you see some stickiness but it should flow freely like edible oil. Mix a bit of colour as per your choice and stir it uniformly; do not make the colour too strong. You may optionally add 25-50 ml of milk to reduce the harsh light.

[4]: Fill this liquid into the reservoir. Put other colour into the drop receiver container, which you'll be putting under the solenoid valve. Some people also like putting a bit of detergent into the receiver container for extra bounce Or may also try with all-purpose body lotion to increase the drop bounce.

Step By Step Guide to Calibrate

Q: What is calibration?

A: Calibration is the process of identifying suitable height of the Dropper, Size of the Drops and correct timer values for a desired collision.

Q: How much time the calibration takes?

A: After setting up stand and device, it would take around 10 min to calibrate. It may take 30 min if you are doing it really slow which is normal. Taking longer would mean there is something which is getting missed, in such case do contact us for immediate help.

Q: What is a jet mentioned above?

A: Worthington Jet is a pillar/column of fluid which is formed by the drops after bouncing up from the receiver container/tray.

Q: What is a receiver container?

A: Receiver container is the vessel which receives the liquid drops falling from the Dropper.

Q: What should be the depth of liquid in the receiver container?

A: The depth may vary depending upon the shape and height of the container, but to able to get a good bounce, minimum depth of 1.5 to 2 inches is recommended, more depth is not a problem.

So How to Calibrate The Device for Water Drop Photography?

Before we proceed to calibration please ensure below **PRE CHECKS** are done -

Note#1 Ensure you have already done the Bluetooth pairing

Note#2 Use plain water in the receiver and dropper both

Note#3 Do not connect the Camera and Flash Initially

Note#4 You have read the Camera focus method and done the focussing beforehand (Without connecting it to the Device)

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Step 1: Fill the receiver container/tray with minimum of around 2 inches of water, it may vary based on the shape and depth of receiver container you are using.

Step 2: Set the solenoid valve on the stand such that the height of the nozzle tip from the water surface of the tray is around 1 to 1.5 feet

Step 3: Connect the Solenoid valve to Solenoid port number # 1

Step 4: Make sure camera and flash are not connected at this stage

Step 5: Make sure Bluetooth pairing was done before, if not, read the Bluetooth setup section and complete it first

Step 6: Connect the power cable to the DropRobo device and turn it on, make sure Android app was not open at this time. If app is open, close it first before turning on the DropRobo device.

Step 7: Launch/Open the app from mobile device and wait for it to connect automatically

Step 8: When connected enter the app to setup the drop parameters

A. Setting up the first drop to get right jet height

1. Go to "Constant" tab select total number of drops to 1. Leave the other parameters as it is.
2. Go to "Timer" tab, leave top camera and flash section as is, Under "Drop" section select valve: 1, set Timer: 50 and Drop size to 30 ms.
3. Make sure the solenoid tube is vertical then release it by clicking start button, [ignore the camera and flash parameters because we have not connected them yet.](#)
4. Observe the height of the pillar after the bounce; the jet height should be at least 2-3 inches, slightly higher is better and it should be fairly vertical.
5. If the height of the jet is less or if it is broken, adjust the stand to move it upwards to increase the height of the solenoid dropper by couple of inches. Repeat this until you get clean vertical and fairly visible jet. Dropper may go up to 1.5 to 2 feet.
6. If even after reaching 1.5 to 2 feet if the Jet is not prominent, try increasing the size of the drop by 5 ms i.e. make it 35 ms, you can go up to 45-55 ms (optionally you may try looping mode by giving drop size an upward increment of 5 ms)
7. By this stage you should ideally have got a workable jet height, if not check depth of receiver tray or [call us](#). Note down the parameter values on a plain paper as you may lose the screen values. Let's assume you got a good jet height at 40 ms drop size.

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B. Setting up the second drop to find a right collision

8. Make sure you have not connected the camera and flash
9. Go to "Constants" tab and select number of drops to 2. **Select loop mode to "Yes"**, leave the other parameters as is.
10. Go to "Timer" tab, leave camera and flash section as is, Select valve: 1 for both the drops, put Timer value of second drop to 170 ms
11. After inputting timer value to 170, set an **upward increment of 5 ms (Loop is optional you may keep trying one after other manually too)**
12. Set the second drop size to 30 ms
13. Press the start button, on looping mode it may take little while to start the dropper
14. Carefully monitor the drop behaviour, observe it and keep a count until you start seeing the nice collision. If something goes wrong start over from point 8 onwards. Based on the count you can understand the suitable timer value.
15. By now ideally you should get nice collision parameters. Note down the values on the paper.
16. Let's assume you got these values with Drop 1: Start Timer - 50, Size 40 and Drop 2 - Start Timer - 180, Size - 30 [You may test with different drop size to get small or big structure formation later]

C. Setting up Camera and Flash Timers

Important note: Before you jump on to setting up camera and flash, please understand the trigger response time of camera and flash depends on camera model and flash model. Response time of each camera and flash may be slightly different, therefore we recommend you to first test your camera and flash separately by clicking images of any subject in the room (i.e. without water drop setup and without connecting the solenoid to the DropRobo device). To test this connect only camera and Flash with the DropRobo device. Open the app and go to "Constants" tab set Camera Exposure to 500 and Flash Exposure to 100 (or less if that works with your flash model), then go to "Timer" tab and set Flash timer to 450 and camera timer to 150 (that's 300ms gap between camera shutter start and flash trigger times). Once you have set these values on the app, click on "Start" button and see how the image exposure is coming. If it is coming dark that means you'll have to either increase or decrease the flash timer until you get nice bright images. Note this exercise is to first understand what should be the gap of camera and flash trigger timers to get right exposure. Basically your flash should be triggered while camera shutter is open, and then match that flash timer with collision time as we explain below.

Both Drops are setup now, let's setup the Camera and Flash so that you open the camera shutter and flash at the time of collision. You can definitely have different timer to get different looking collision shots. Make sure you remove the **increment values inputted earlier**, make them zero. Connect the Camera and Flash; **make sure Camera and Flash are not ON at the time of wiring**, once cables are connected turn them on. (To Set the Camera focus and settings read the other part of the manual)

17. Go to "Constants" tab and set the camera exposure value to **500** ms and flash exposure value to 50 or 100 ms, if it's already set leave it like that. (Please note flash exposure value doesn't matter much as speed lights are generally very fast and would shut at their own as soon as they reach

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their peaks based on power selection, what is more important is the flash trigger time which we'll set later)

18. Setting up the Flash: Turn off the Camera if it is ON, Go to "Timer" tab and set the Flash timer to 450. Press the "Start" button and observe the collision manually, if you see collision your flash timer is good otherwise adjust the timer accordingly.
19. Setting up the camera: You would notice as soon as Flash timer value was entered the Camera "Timer" field was also updated automatically. It is by default set to (Flash Timer + 300). Do not change the Camera timer. However, during trials you may directly change the Camera timer value by manually inputting the value. Turn on the Camera.
20. You are now all set to try Flash, Camera and Drops together. With the settings done so far try few shots and observe. Adjust timing as per the behaviour of drops or as per the photo exposure you get. Later on try with viscous fluid, but note the timer values may require readjustment slightly. Therefore, we recommend you to first understand how the kit works before taking shots with viscous liquid.

D. You may also try with 3 drops. Use first 2 drops of around 25-30 ms each & release almost one after the other. These two drops would form a taller jet together. Then setup a third drop to collide with the pillar as explained before in this guide.

Note: Keep at least 15-20 ms gaps between start times of the two drops as solenoid takes that much of time to react to your command between the drops. **Timer values mentioned are to give initial idea; you will have to find your own suitable values based on your setup.**

Note: You might have seen images with super tall jets; those jets are artificial jets and are created using a hidden pressure valve which is kept inside the receiver container just like a water fountain. This is not in the scope of this Kit; however you can ask us in case you are interested to setup the same at your own.

Operating principle/method of the multi valve setup would be the same. You will have just select a different Valve Id for different colour drops.

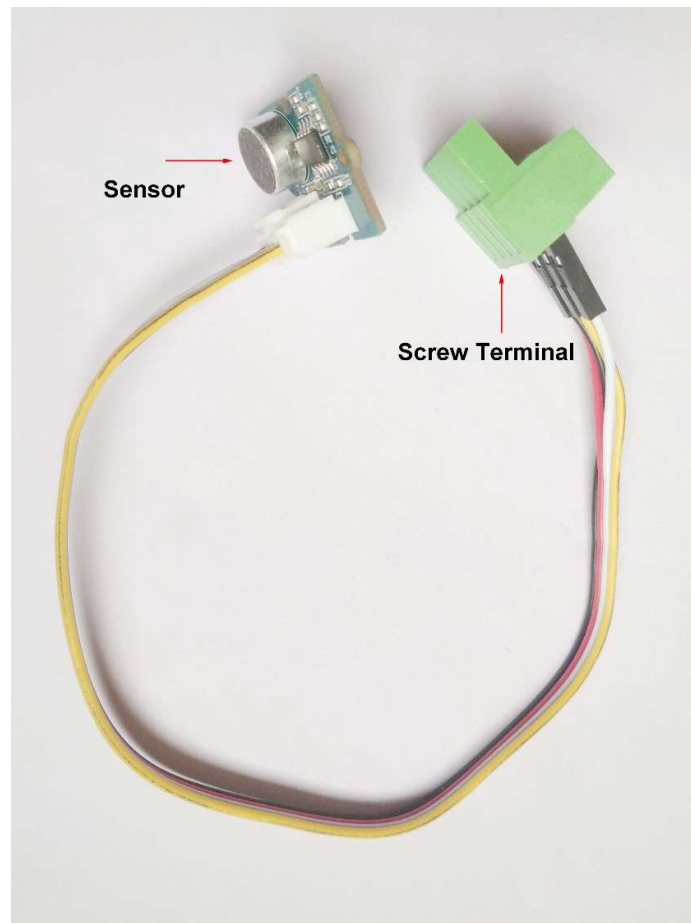
Sensor for High Speed Photography

With the use of various sensors, DropRobo PLUS can also be used for different kind of high speed photography. DropRobo PLUS comes with connection port where external sensor can be connected. The sensor can be an Analog sensor, Digital Sensor or a special type of distance sensor. Most commonly used sensors are –

1. Sound Sensor (Can be an Analog or Digital)
2. Obstacle Sensor (Mostly a Digital Sensor)
3. Light Sensor (Mostly an Analog Sensor)

How to connect sensors?

It is easy to connect sensors supplied by DropRobo store. All sensors have 4 wires which have to be connected to a 4 screw terminal sensor port on the DropRobo device. The Screw terminals are removable attachments, like shown in the picture below. The green part is the screw terminal which goes into DropRobo device.



The Working Principle of Sensor

Once the sensor is connected, it can be activated by Android app by clicking on “Activate Button”.

Sensor would start reading the values, the readings are integer values for an equivalent intensity measured by the sensor. For example, if it is a Sound Sensor, it would read sound intensity and the value will be represented as a number which would be proportionate to the loudness of the sound.

Based on certain read value range, Camera and Flash can be triggered. This threshold value at which the Camera and Flash should be triggered can be set using the android app.

How to work with Analog Sensors

Analog sensor would trigger the photography event when the sensor reading crosses the threshold value set by the app. Example: If threshold value of sound trigger is set to 450, the photography event would not trigger if the sensor reading is less than 450. The photography event will be triggered as soon as sensors reads a value more than 450. Here 450 represents a proportionate sound intensity value. Any sound which is intense enough to read more than 450 would trigger a photography event.

How to work with Digital Sensors

Theoretically digital sensor reads only HIGH or LOW flags. For example, in case of a laser obstacle sensor, it would indicate if any obstacle is there on its way or not.

App can configure both the conditions.

User has to select “Digital High” or “Digital Low” as photography condition for the photography event to be take place. If the user selects “Digital High”, that means photography event would take place as soon as sensor reads it HIGH. If the user selects “Digital Low” then in this case the photography event would take place when sensors reads it LOW.

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What is “Dark Room” checkbox on sensor screen?

We know opening and closing of camera shutter takes time. The high speed photography events are so fast that camera may not be able to react fast enough to capture the moment.

The “Dark Room” option is to keep the camera shutter open in advance. When user selects this option, the camera would immediately open its shutter as soon as the sensors gets activated and would keep it open until the photography condition meets i.e. when the photography event triggers.

To be able to work with this option, the ambient light should be low or dark so that it does not overexpose the frame, and should only capture the moment when the flash gets fired.

-----X-----

If you have any questions, visit [DropRobo Frequently Asked Questions](#) and in case your question is not listed feel free to submit your questions online.



Help us improving this guide by sending suggestions to contact@droprobo.com

Or [whatsapp](#) +91 9112280007