codrone EDU

Diagnosing your Drone

Aerial Drone Program Summit 2025

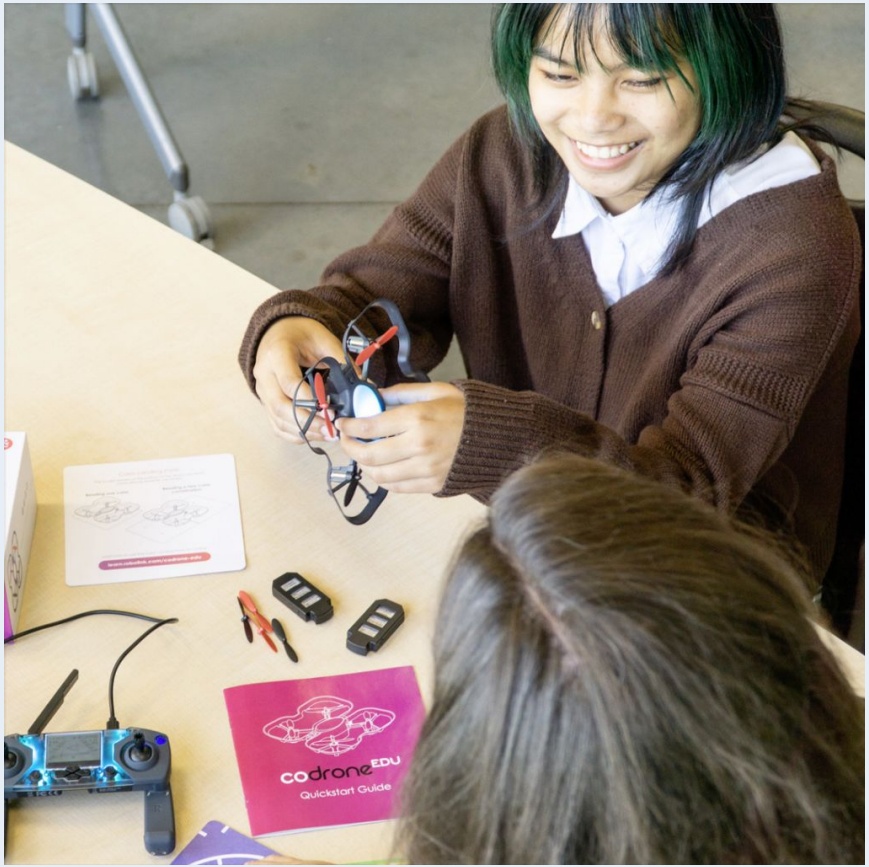
BLOCKLY for ROBOLINK

python for ROBOLINK

Agenda

- Welcome and Introduction
- Reviewing CoDrone EDU Drones
  - Troubleshooting your drones
- Reviewing CoDrone EDU Controllers
  - Troubleshooting your controllers
- Spotting Irreparable Damages
- Troubleshooting Activity!
- Closing Remarks / Questions

Get into teams!



- For this presentation we will be getting into groups of 3-5 people

- As a group we will review and test our drone/controller knowledge

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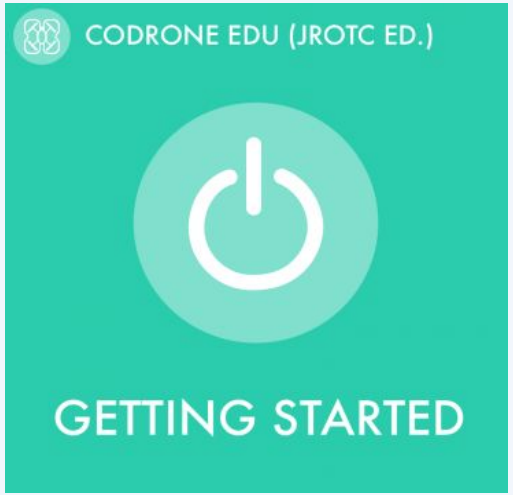
1 Drone Overview

Getting to know your drone

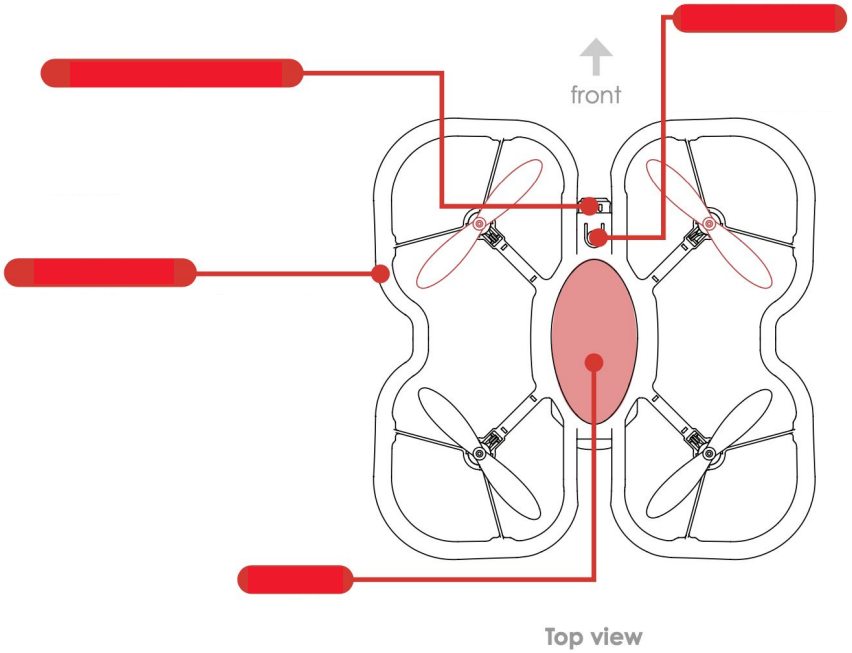
Basecamp Lesson 0.3

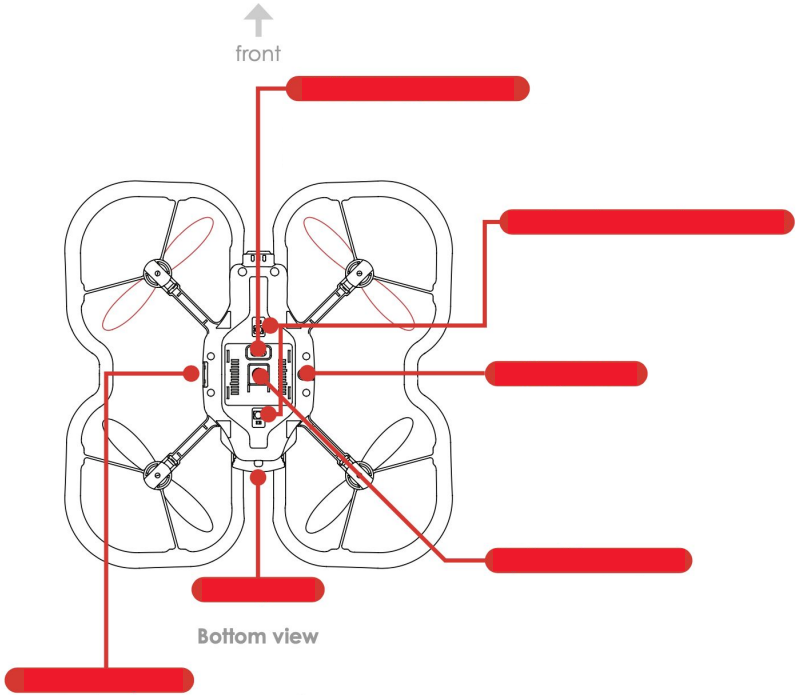
0.3: Getting to Know Your Drone



0.3: Getting to Know Your Drone (JROTC ed.)

Do you know all the parts of the drone?





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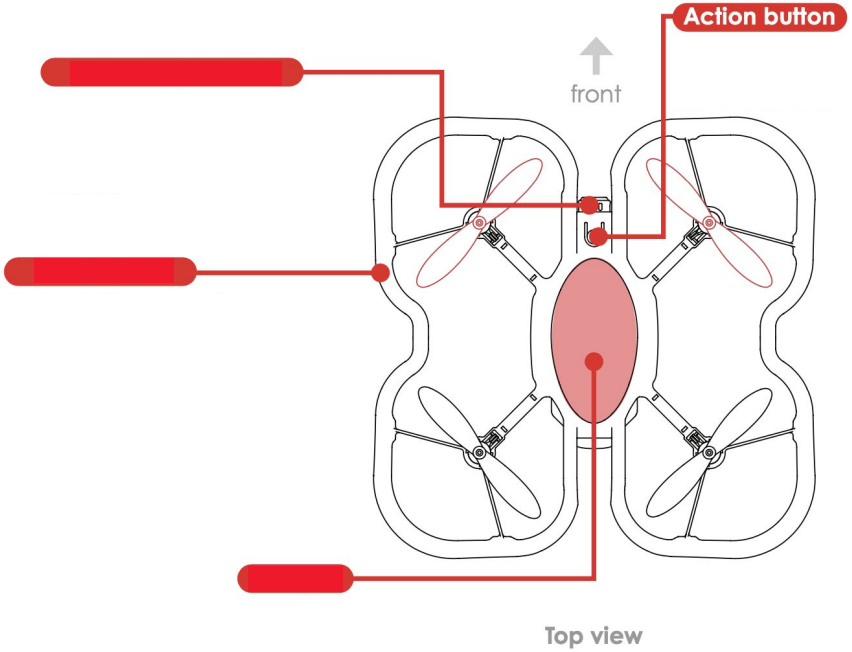

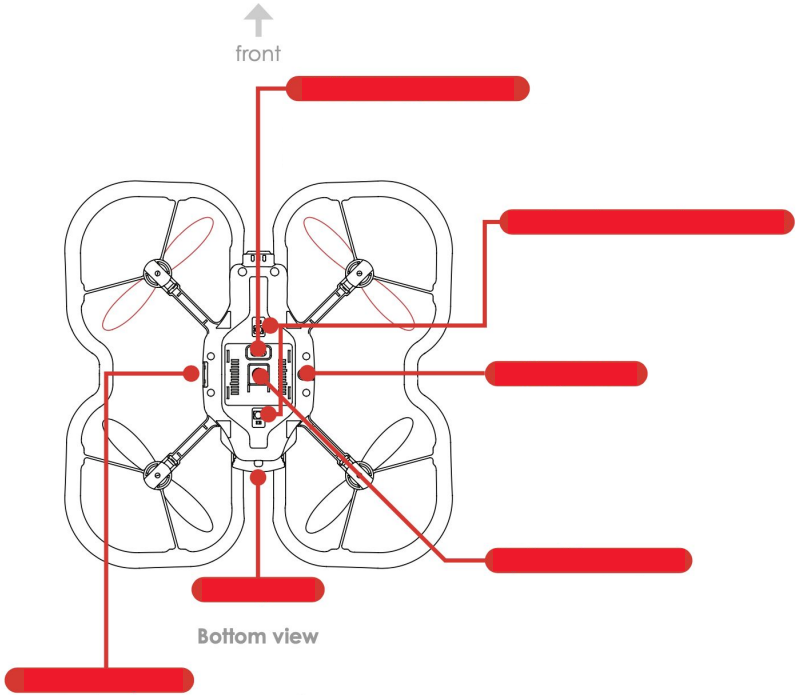

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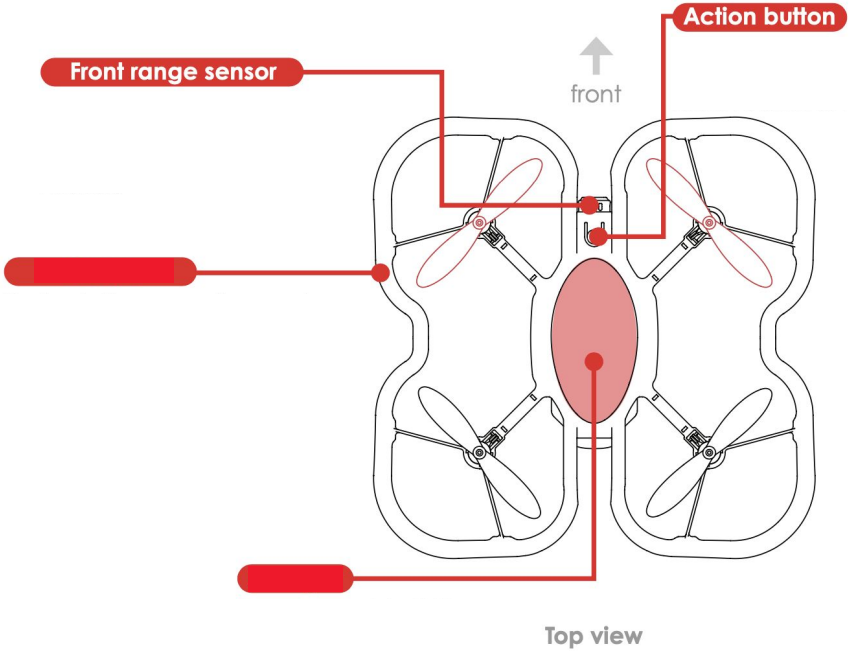

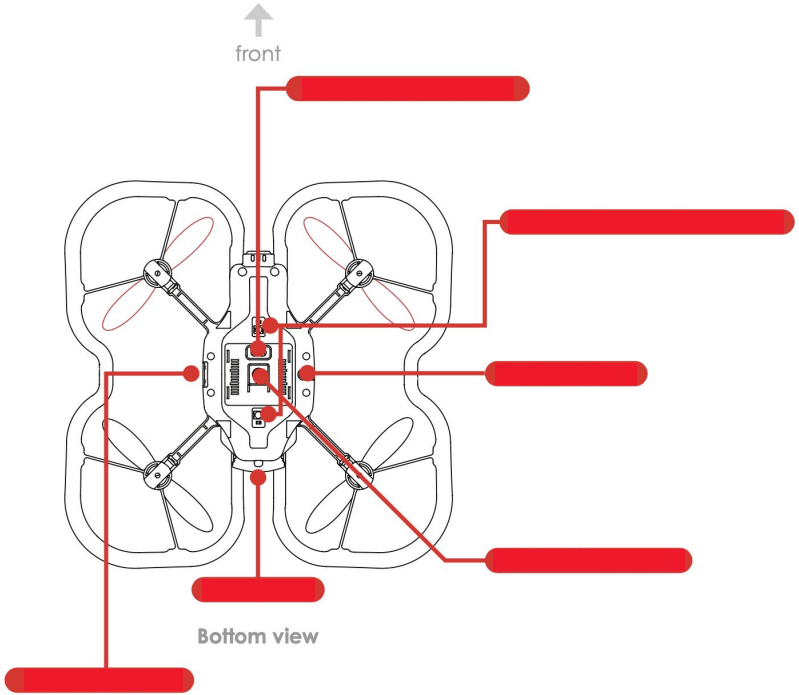

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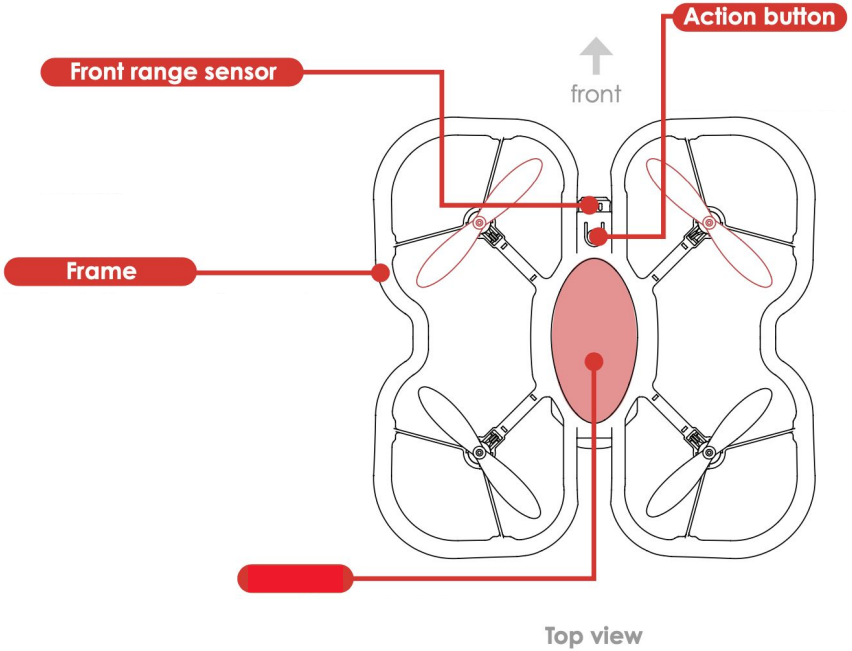

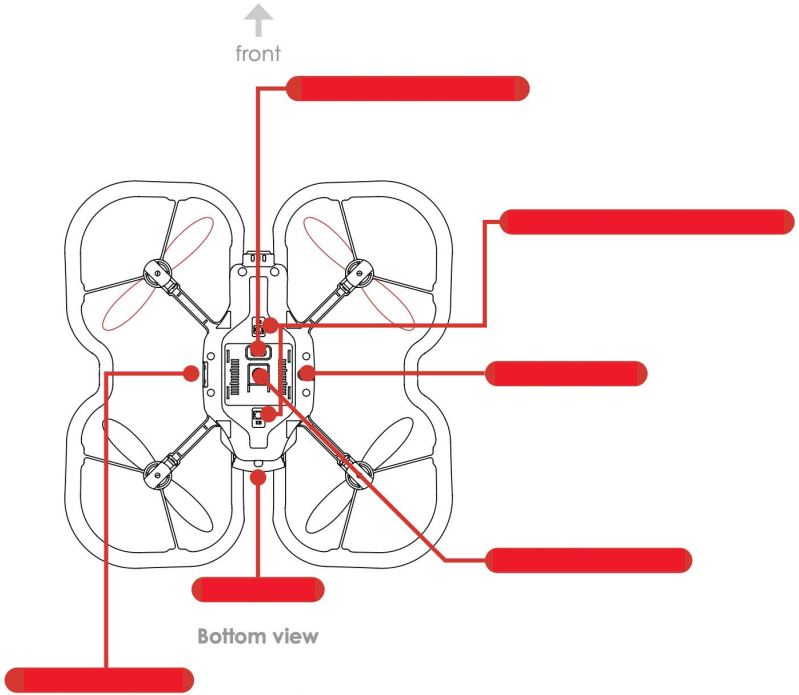

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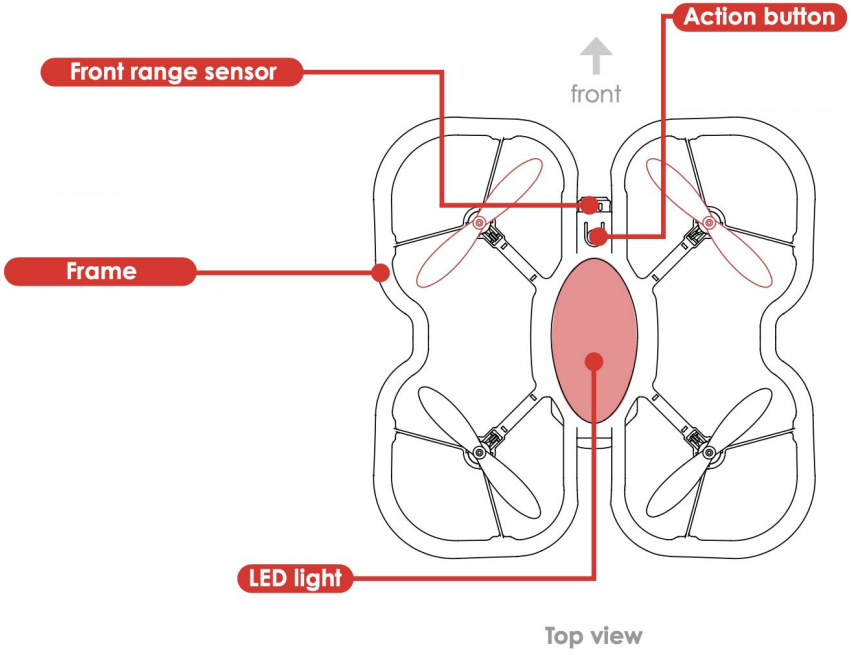

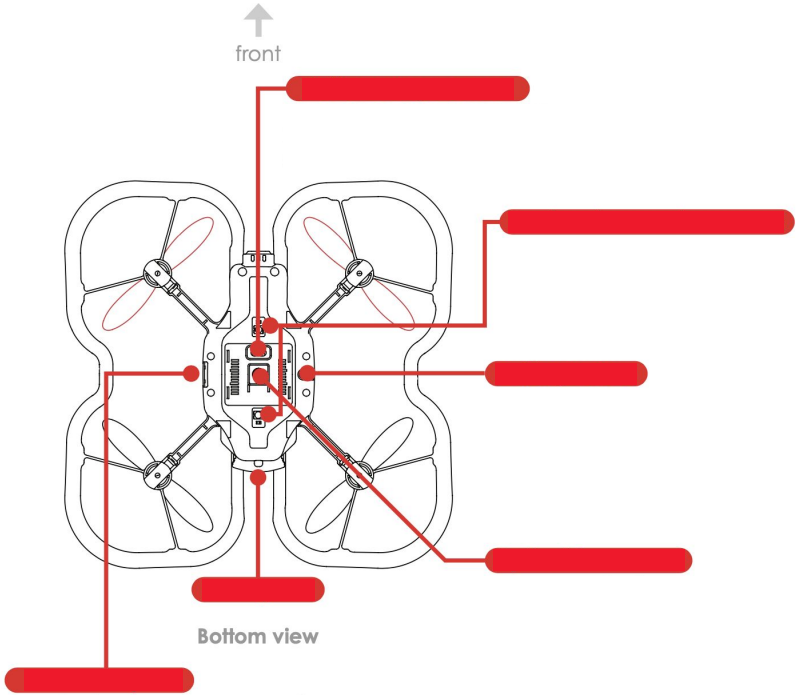

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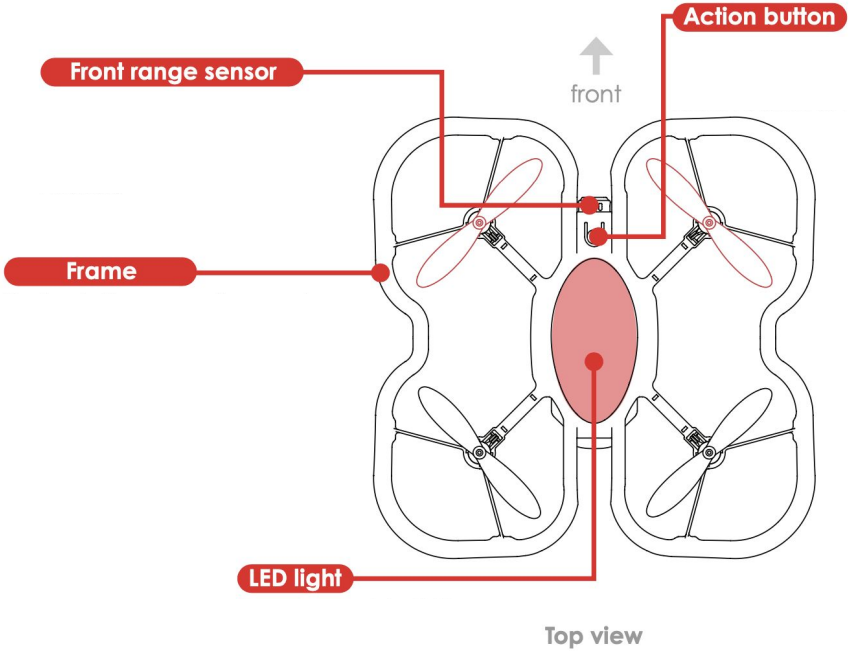

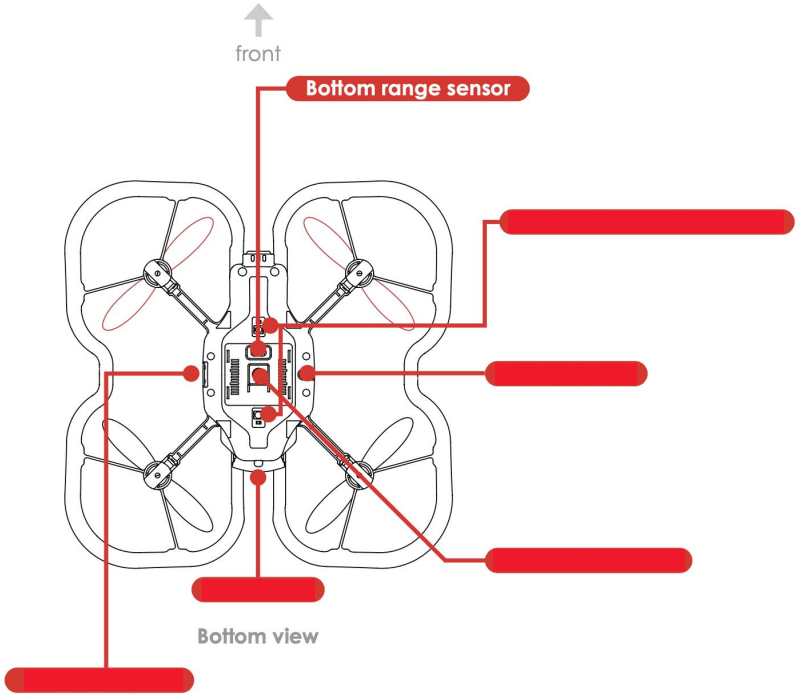

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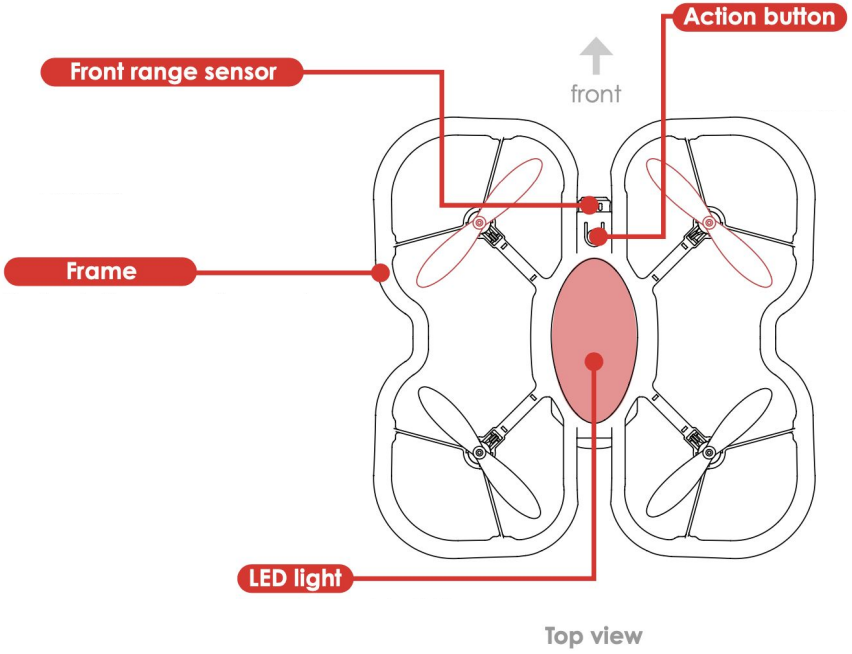

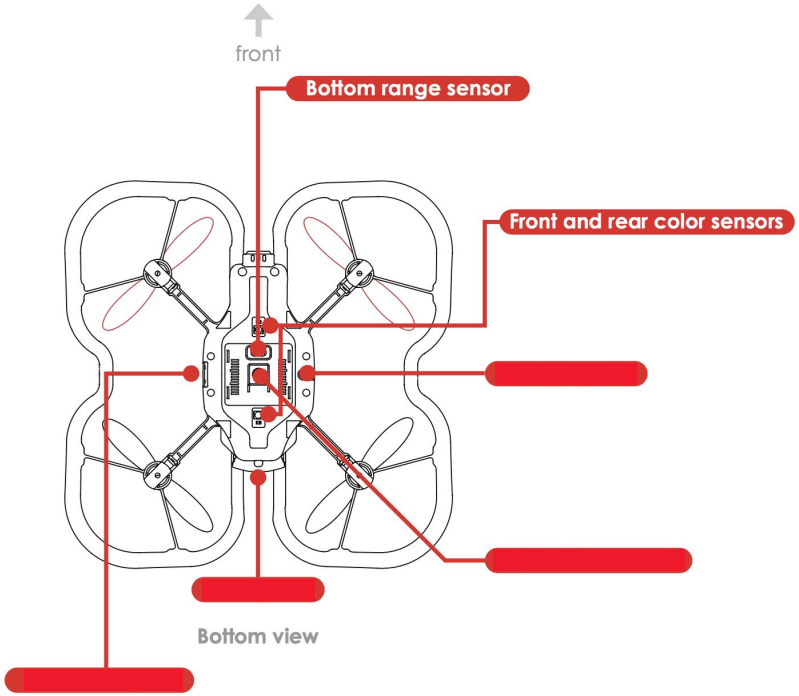

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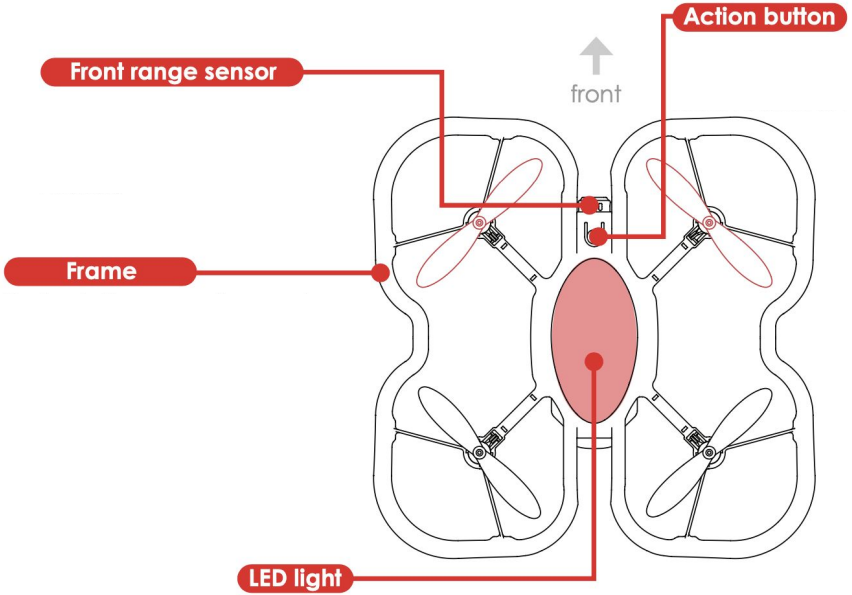

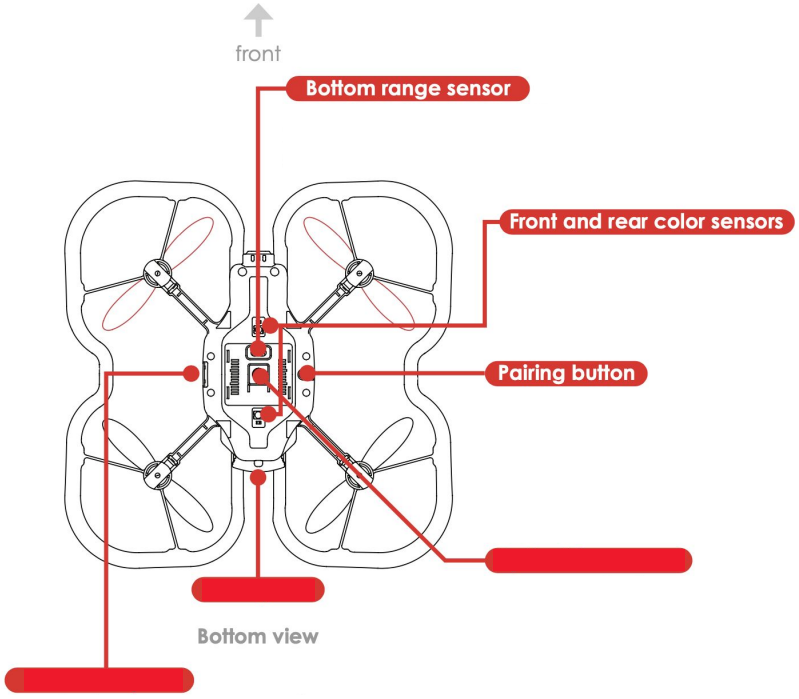

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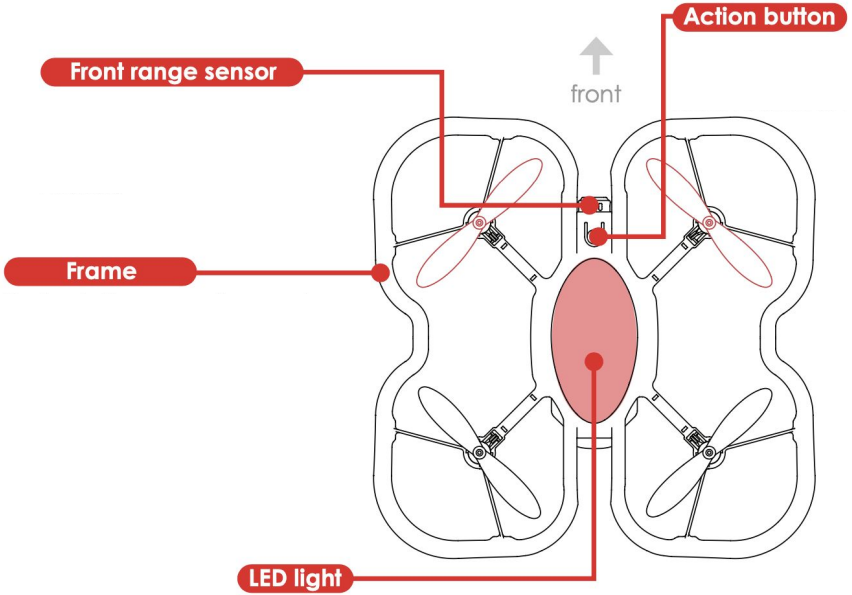

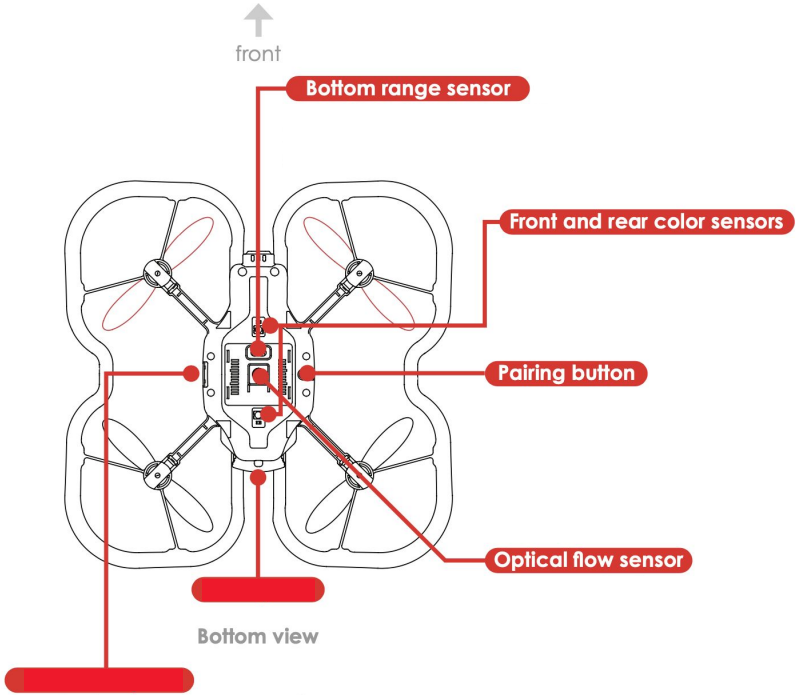

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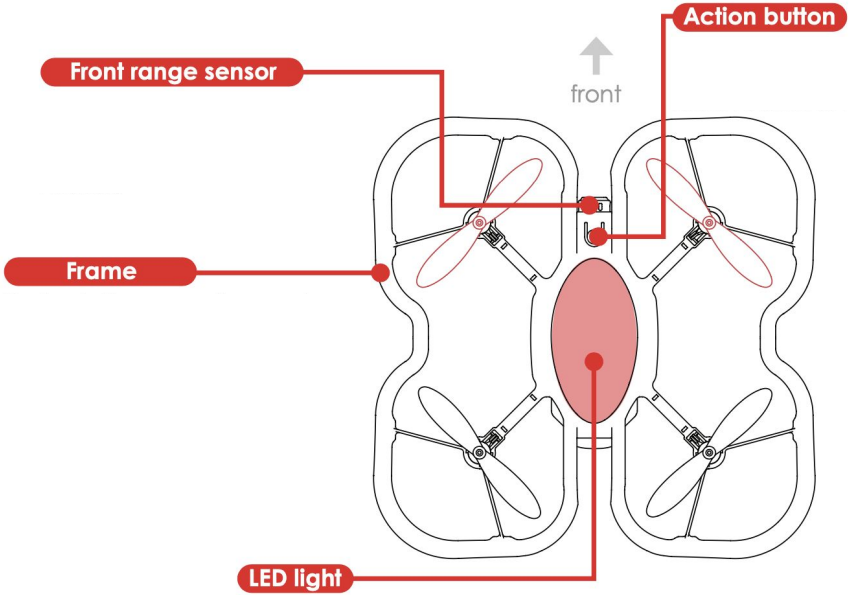

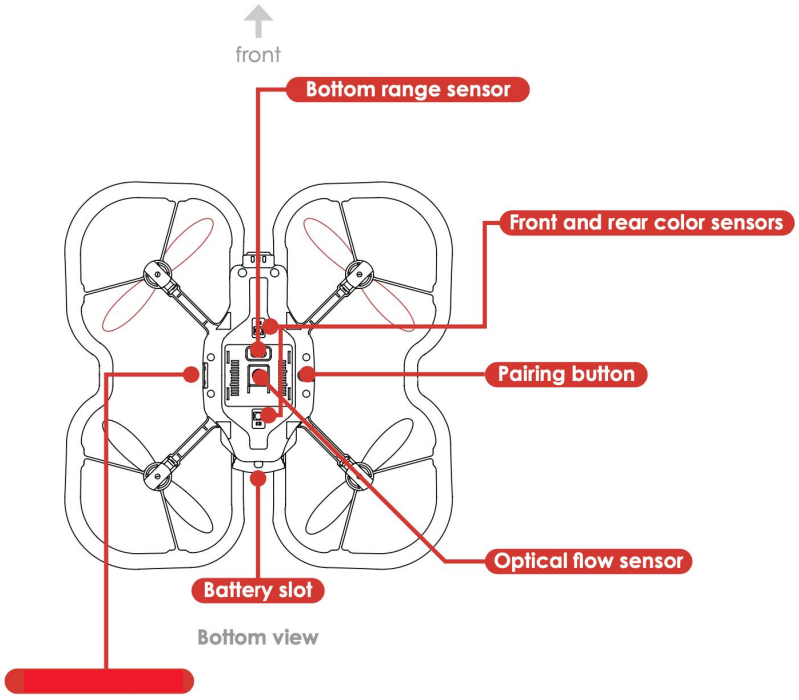

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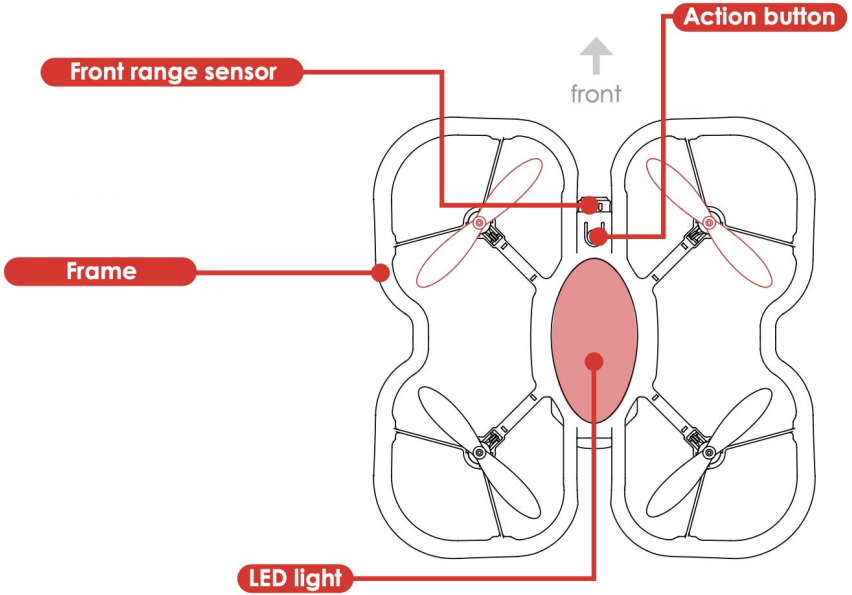
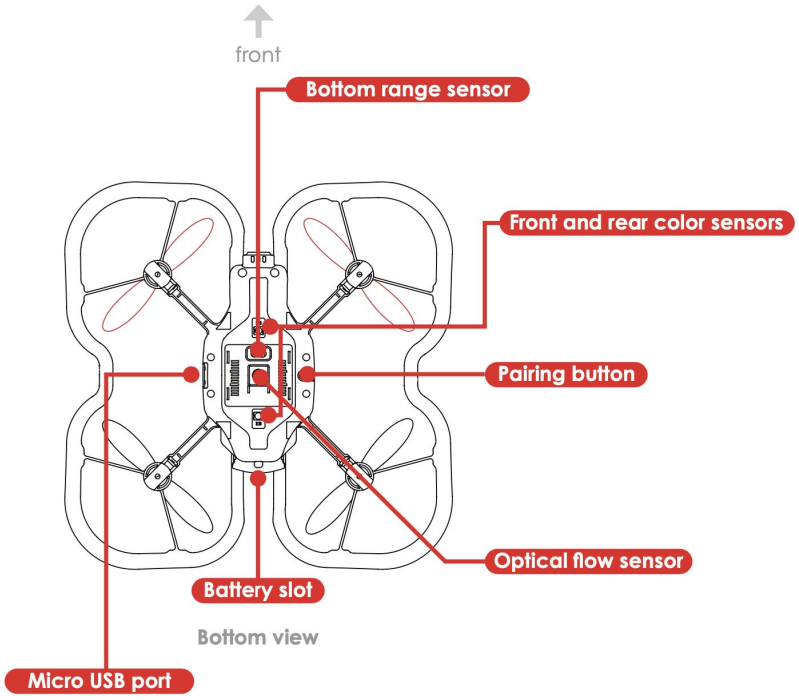




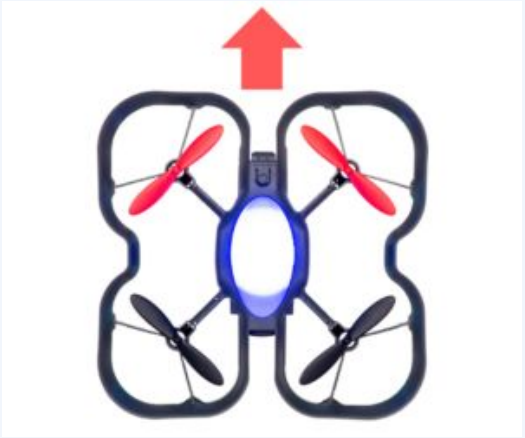
Where is the front of my drone?

- When piloting a drone, it is important to know which direction is “forward”.

- There are three ways to detect the front of your drone:
  - [redacted]
  -
  -

Where is the front of my drone?

- **There are three ways to detect the front of your drone:**
  - Front range sensor
  - Green/red navigation LEDs
  - Propeller colors (only if you haven't replaced any propellers, as this can change)



Flight Rules + Checklist

- ❑ Designated indoor flying area is clear
- ❑ Objects that may get caught in the propellers are secured
- ❑ Line of sight is unobstructed
- ❑ The appropriate flight mode settings are selected
- ❑ Frame and motors have no structural damage
- ❑ Sensors are unobstructed
- ❑ Propellers, motors, and silicone bumpers are in the correct position
- ❑ Propellers and motors are free of debris and spin freely
- ❑ Battery is charged and not damaged
- ❑ Antenna is extended and pointed at drone
- ❑ All firmware is up-to-date

Troubleshooting

What is troubleshooting?

Troubleshooting is the process of identifying and resolving some problem with your product or your code.

It's systematic!

If you don't know where to start, don't worry! There are general steps to guide you through the process

It's a skill!

And like any skill, it needs practice. You may not know how to fix something right away!

Troubleshooting steps

1. **Establish the problem**
   Define the issue! What behavior is being observed and how does it deviate from the expected behavior?
2. **Isolate the variable**
   Narrow down possible causes. Think of what you know that could cause the issue you are experiencing, and make a list!
3. **Test a solution**
   Theorize a solution for each possible cause you have. Determine the right solution using the process of elimination: test each solution one by one.
4. **Document the process**
   Make sure to keep track of what you're doing! The information you gather can be useful if the problem ever happens again!

You can always reach out to **support@robolink.com**

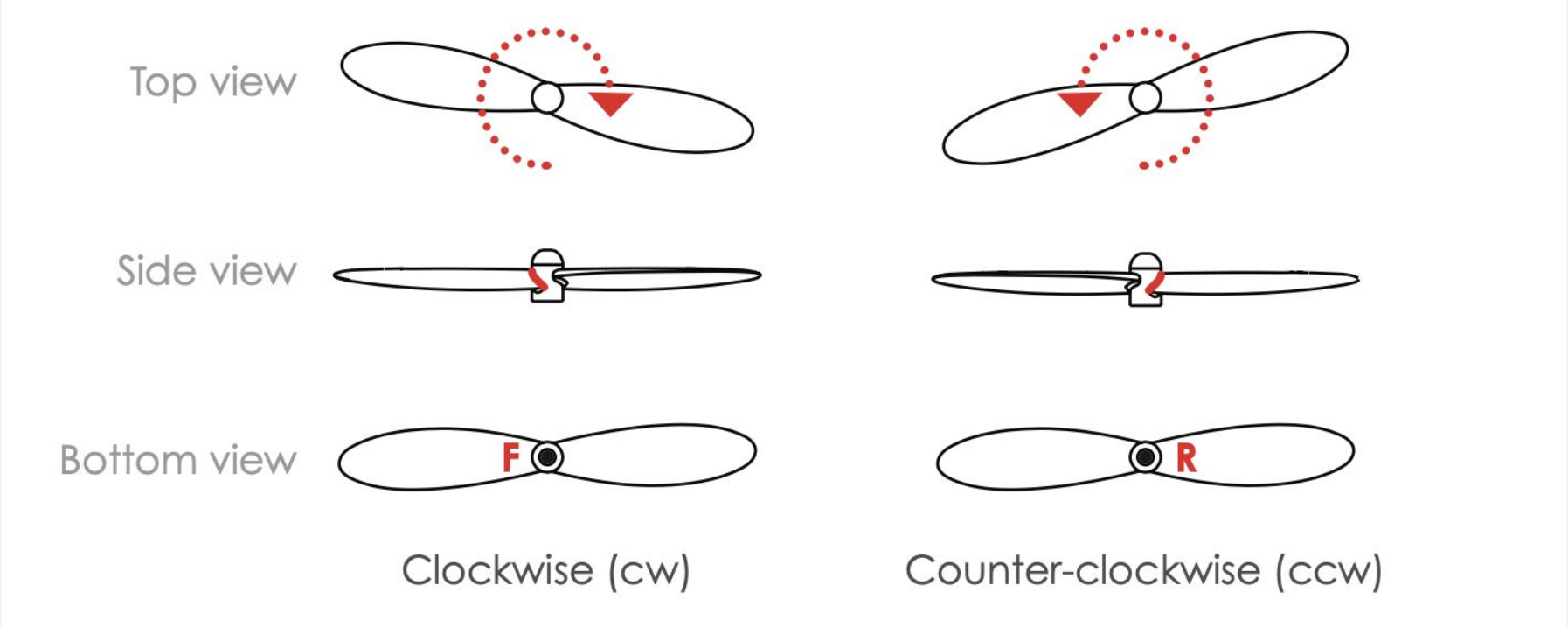
Troubleshooting Can / Should Be Very Easy!

There are only **four** things that you need to look out for when it comes to troubleshooting your drone:

- Propellers
- Motors
- Frame
- Firmware

If you can maintain good daily maintenance checks your drones will go a long way!

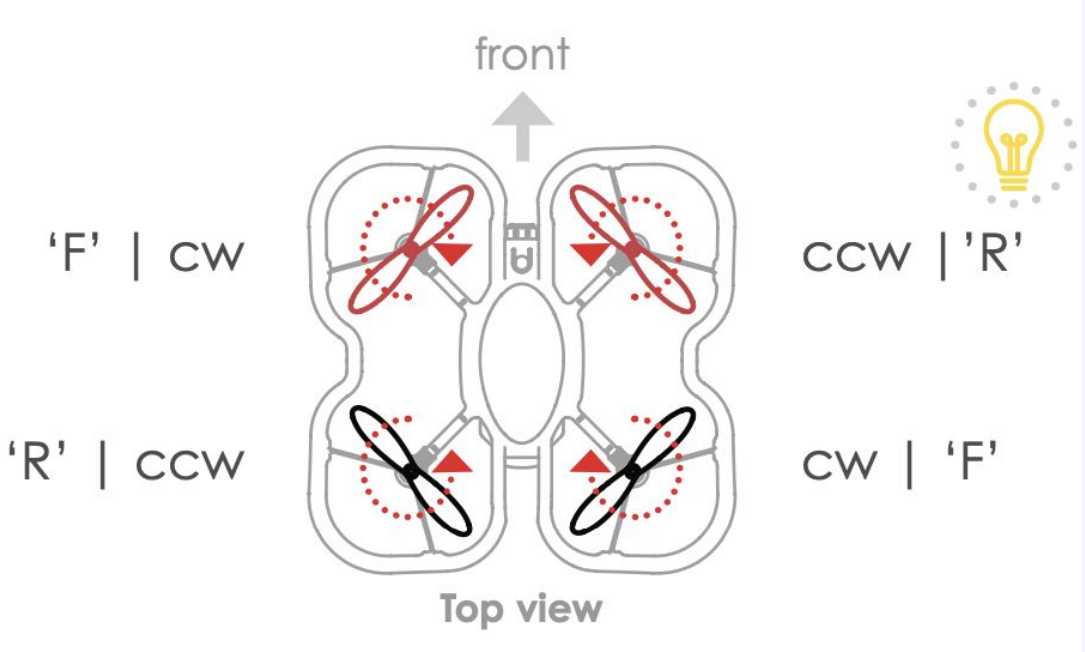
Propeller Placement



🔍Flip your drone upside down. Do you see the letters?

Propeller Placement (continued)

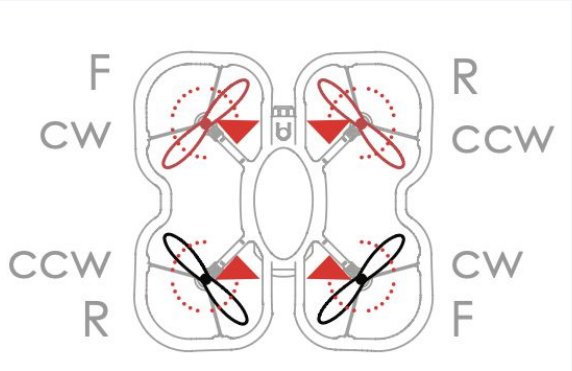
- The front two propellers should spin inward toward the body of the drone
- The back two propellers spin outward, away from the body of the drone.
- The propeller directions must match the diagram for the drone to take off.
- Remember that in this case, the color of the propeller does not indicate the orientation of the motor.



💡 Tip: If you have trouble remembering which propeller is which, think **F** for fast forward ⏭ (clockwise) and **R** for reverse ⏮ (counterclockwise).

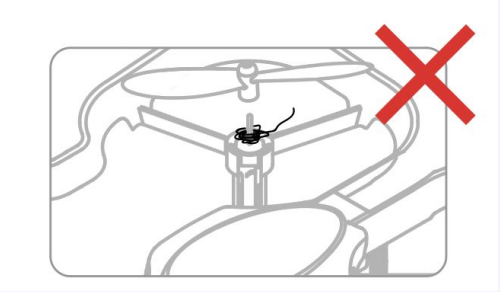
Propeller Maintenance

Propellers with hair or debris and damaged propellers will affect flight drift and can even prevent takeoff.



Tips

1. Clean and inspect propellers before each class or after a crash
2. If the propellers are bent or chipped, replace the propeller
3. If the propeller is hitting the guards, do not fly the drone
4. Propeller hole is warped or bigger than usual



Test Your Knowledge!

Now we are going to look at some examples of drones we have seen. Can you spot the issue?

Confer with your group if you have any questions!

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What do you think will happen if propellers are in the wrong direction?

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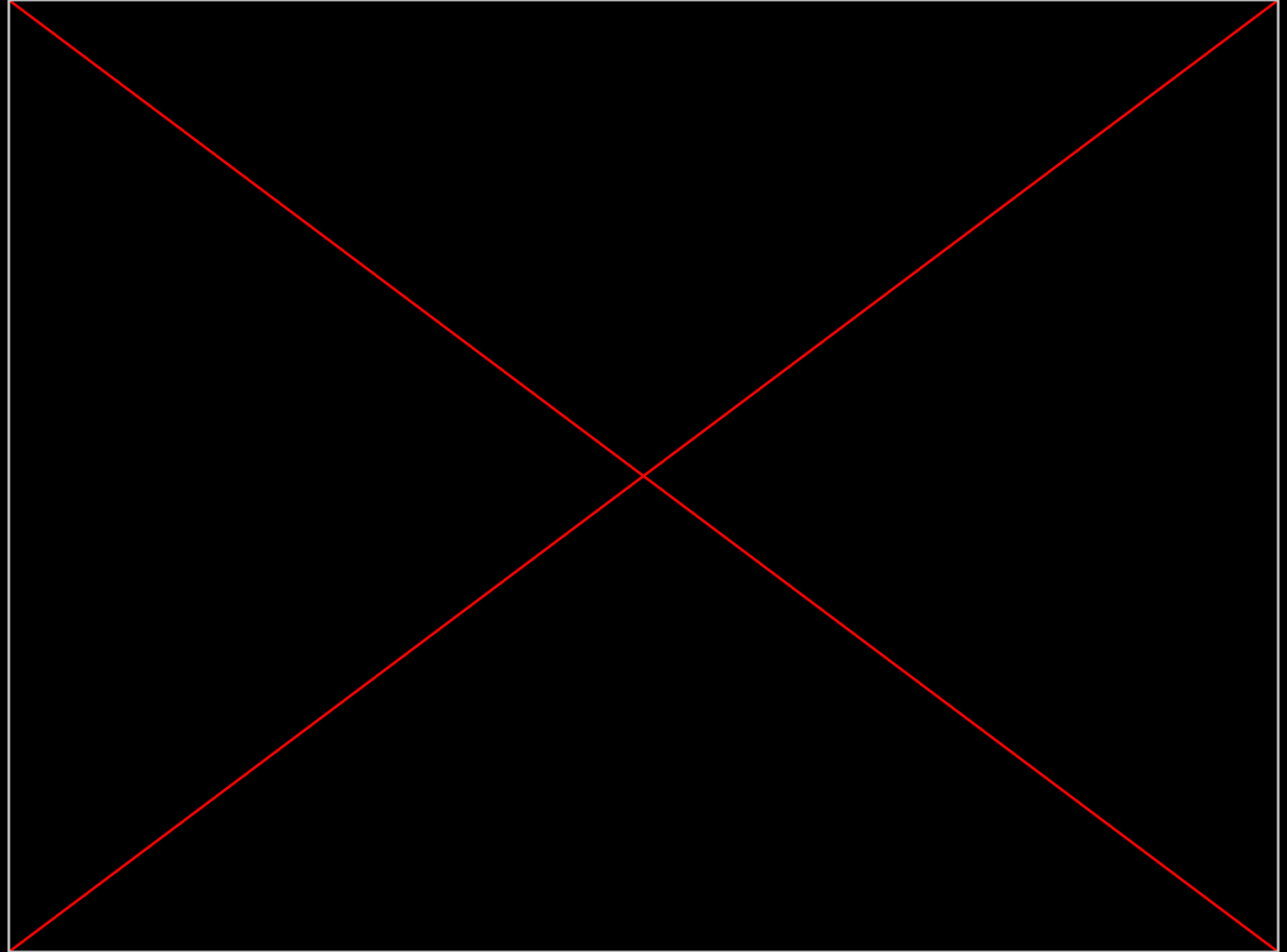
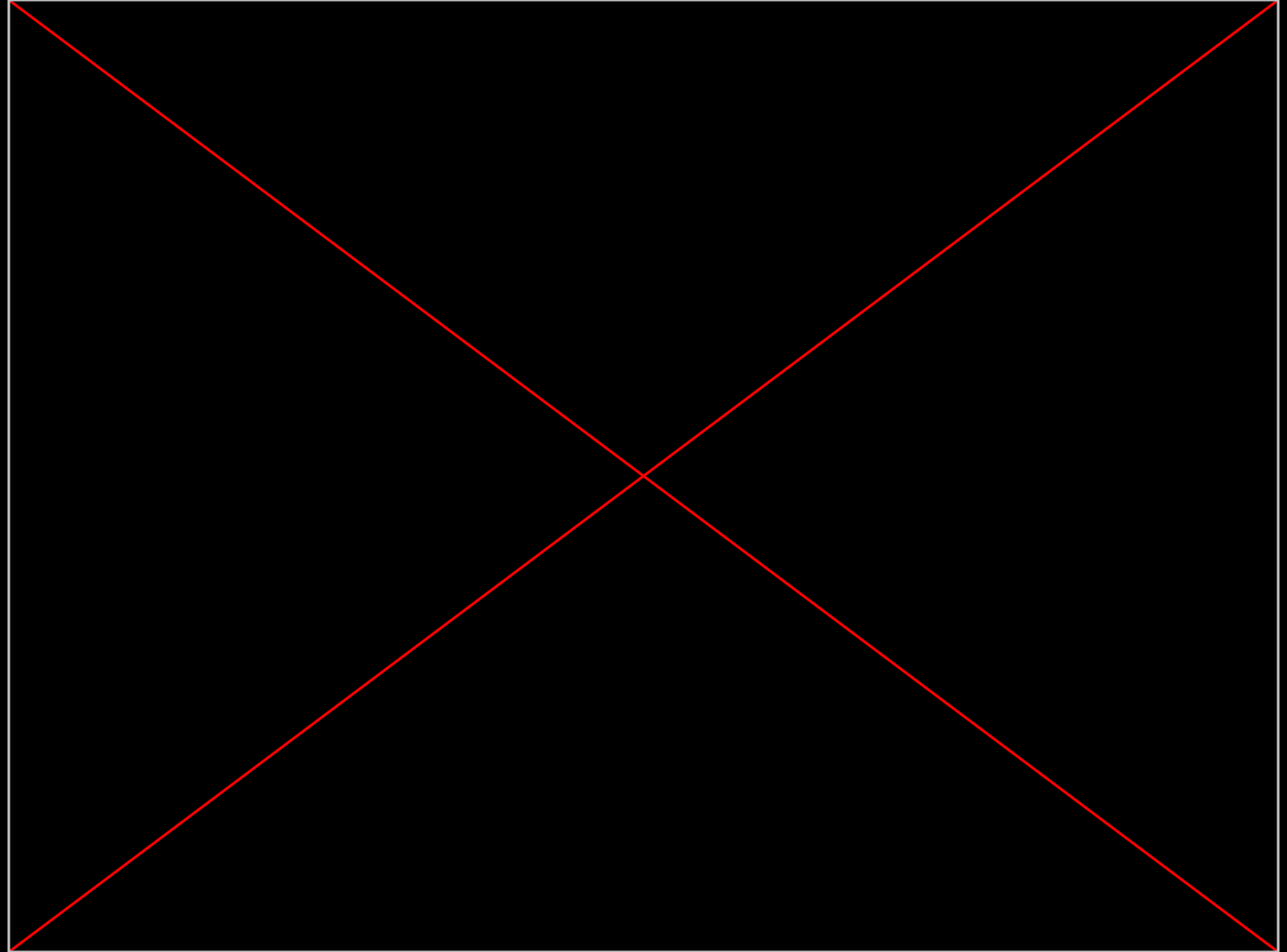
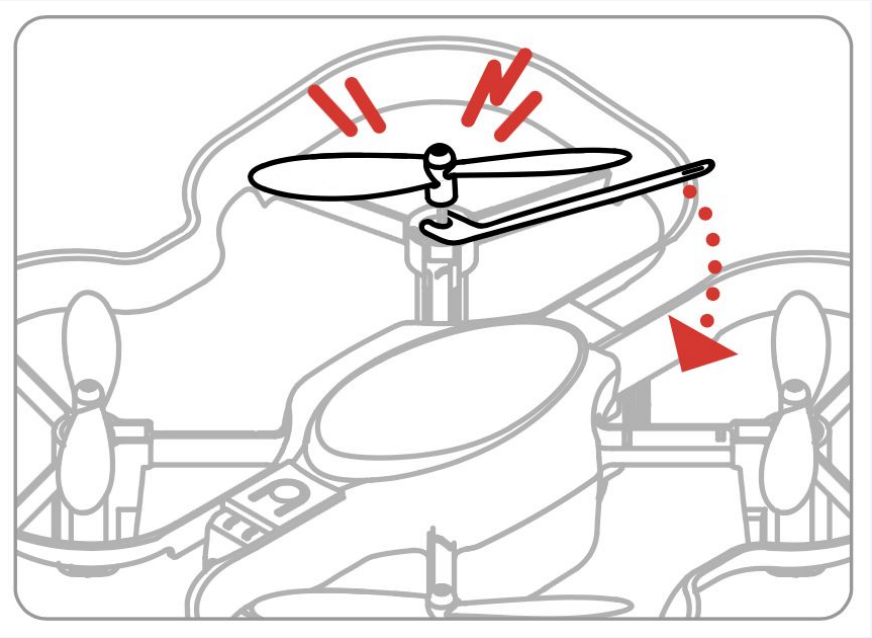




THESE ARE REAL

Removing Propellers

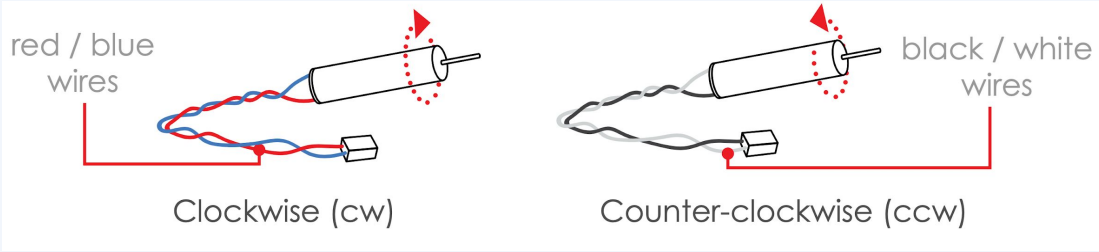
To remove a propeller for replacement or to clean the motor of debris, use the propellor removal tool to lift and pry the propeller off.



Follow along

Motor Placement

- The motor differences may not be as obvious.
- Flip the drone upside down and pay attention to the color of the wires. There are 2 types of motors.
- Like propellers, the motors need to be in the right positions for flight.



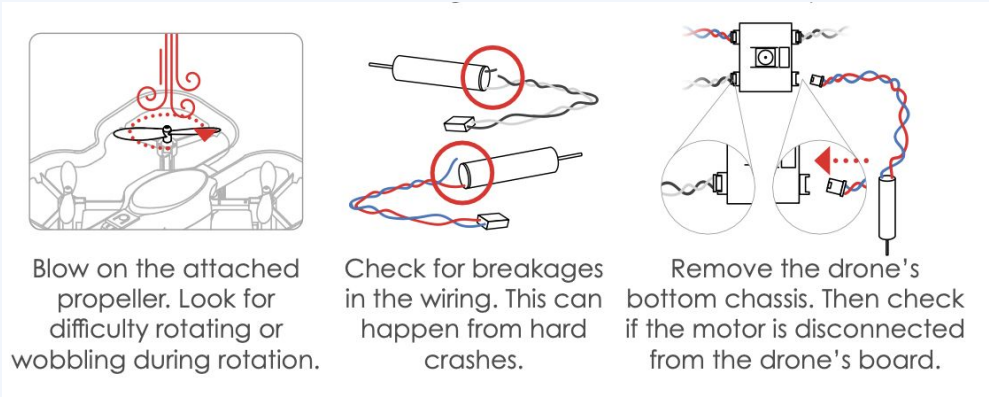
Motor Placement

1. Inspect motors before each class or after a crash. Check for the silicone bumpers!

2. When replacing a motor, replace the motor with the correct orientation

3. Be careful when disconnecting a motor. The wires are delicate!

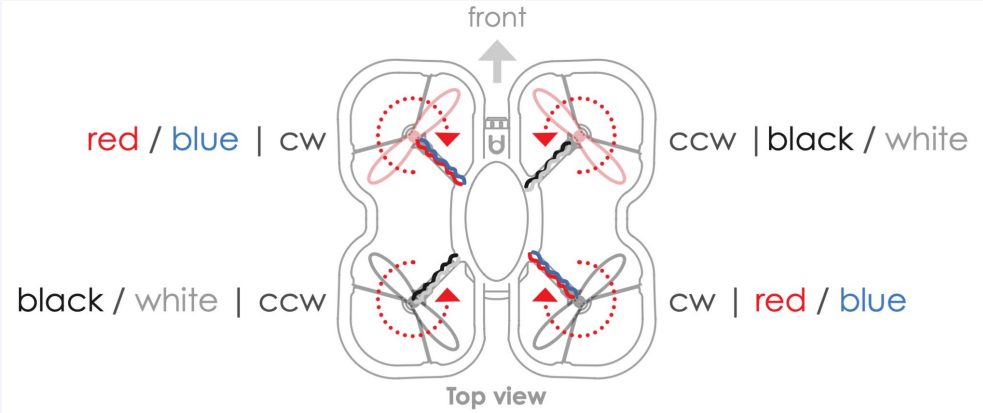
4. If your drone gets stuck while flying, shut off motors immediately.



Blow on the attached propeller. Look for difficulty rotating or wobbling during rotation.

Check for breakages in the wiring. This can happen from hard crashes.

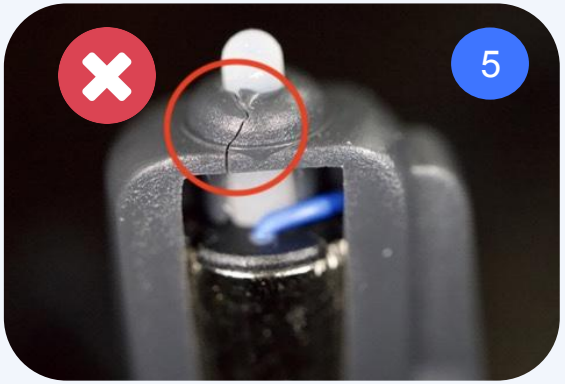
Remove the drone's bottom chassis. Then check if the motor is disconnected from the drone's board.



Motor care updates

We've updated our help article on motor care to keep your drones flying! Here are some reasons your motors may fail.

1. Severe impact or crash (accidents happen!)
2. Motor overheating without a cooldown period
3. Motor stalling or not spinning
4. Missing silicone bumpers
5. Cracked frame
6. Pinched motor wires



Help article: How to take care of your motors

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WARNING:

Robolink Does NOT Advise that you repair motors with the following:

- Glueing of any component (hot glue, super glue, etc.)
- Soldering of any component / drone PCB components

For more information, please view our Warranty Page

Test Your Knowledge!

Lets take a look at some other examples! Can you explain what might be causing this?

Confer with your group if you have any questions!

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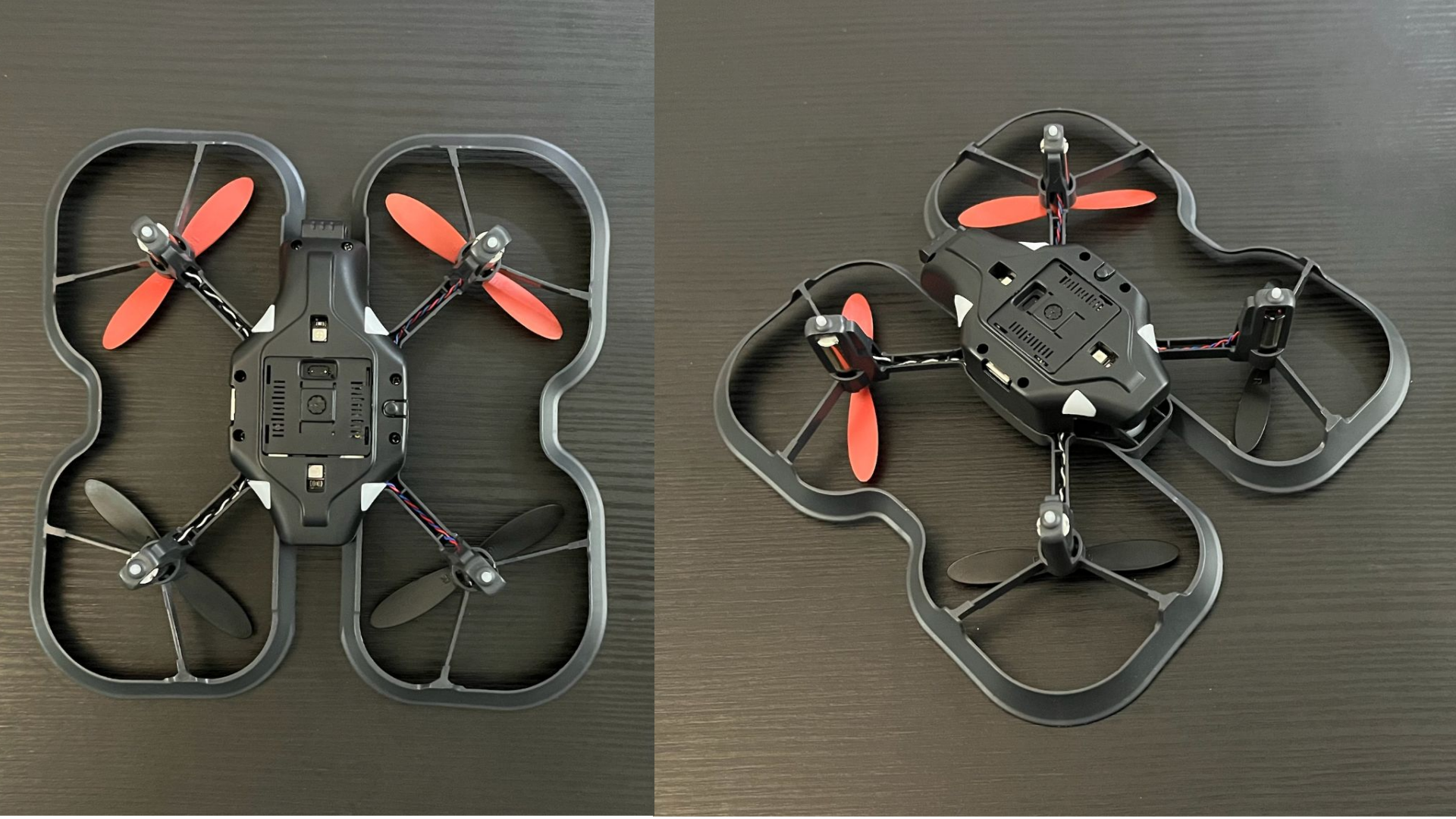
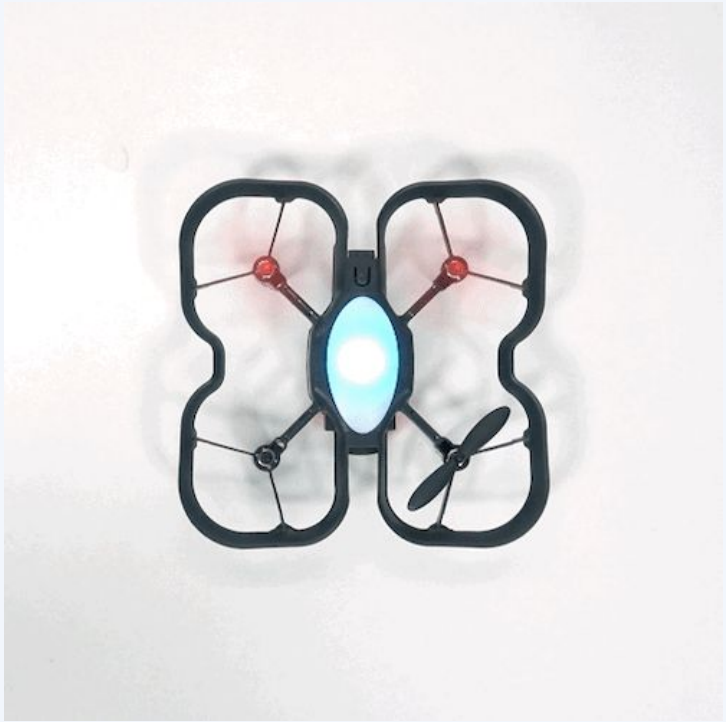


“Invisible Issues Scenarios”

1. Motors look perfectly normal, no visible damage, but the drone is still not flying



HelpDoc Article:
What do I do if one of my CoDrone EDU propellers isn't spinning?

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“Invisible Issues Scenarios”

2. MOSFET damage

HelpDoc Article:
Why does my CoDrone EDU motor spin when I insert a battery into the drone?

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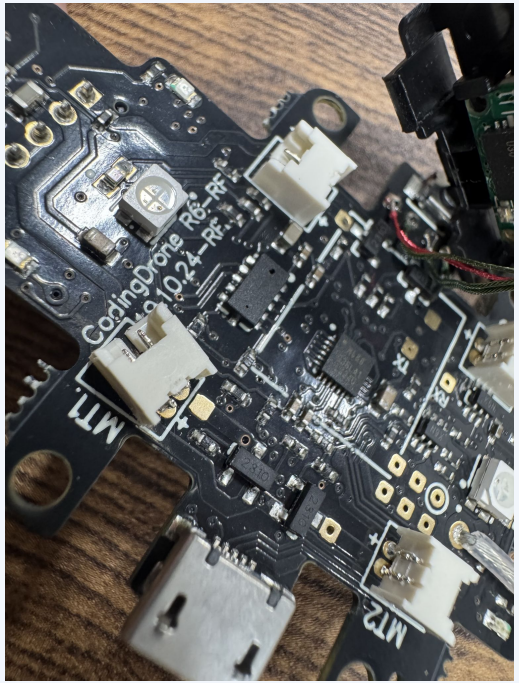
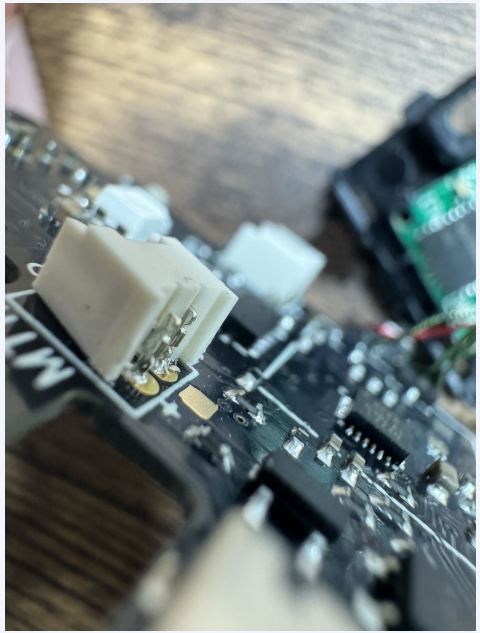
“Invisible Issues Scenarios”

3. Broken Motor Port Connector





HelpDoc Article: How do I replace the motors on my CoDrone EDU?

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Propellers hitting the guards

Issue

I try to take off and one or more propellers is making a grinding sound against the frame.

Steps

1. Check the frame to see if it is warped from damage. Replace the frame if it has scratches from the propeller spinning against it.
2. Check the propeller to see if it is bent. Replace the propeller if it is bent.

Note: Friction between the propeller and frame will cause the motor to burn out! Replace your frame so you don't have to replace your motor and propellers as well

WARNING:

Robolink Does NOT Advise that you repair frames with the following:

- Glue (hot glue, super glue, etc.
- Any form of tape (duct tape, painters tape, etc.)
- Resin / epoxy

For more information, please view our Warranty Page


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How to maintain and check your batteries

What to lookout for:

- Swelling or puffing
- Broken / opened plastics
- Does your battery make a noise when you shake it?

Drone battery has not expanded and has no signs of structural damage.

What to Avoid:

- Do not bang batteries or throw them around
- Do not leave them on the charger for extended periods of time

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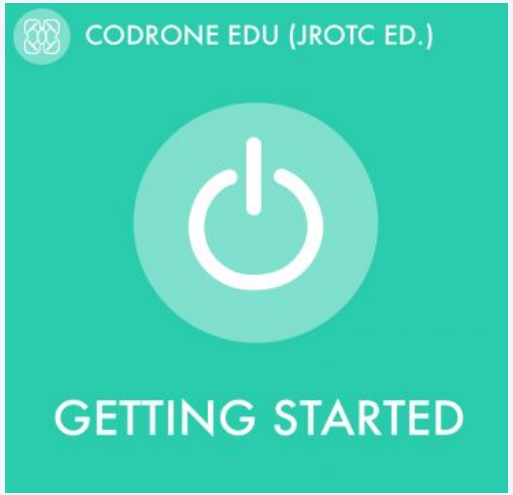
2 Controller Overview

Getting to Know Your Controller

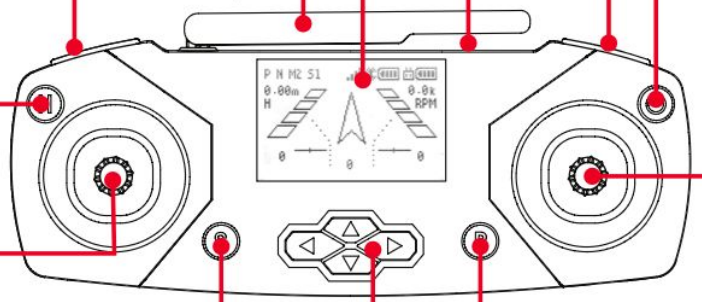
Basecamp Lesson 0.5



0.5: Getting to Know Your Controller

0.5: Getting to Know Your Smart Controller (JROTC ed.)

Controller Overview



Micro USB port
Used for coding and controller firmware updates.

LCD screen
Displays drone information and settings. Can also be programmed with code.

Antenna
Extend and point at drone for best connectivity.

L1
Press: Change flight speed (30%, 70%, 100%).

Press and hold: Take off / Land.

H
Press: Turn LCD screen backlight on / off.

Press and hold: Return home during flight.

Left joystick
Left and right: Yaw (rotate left and right).

Up and down: Throttle (move up and down).

S
Press: Go to previous display mode screen.

Press and hold: Go to the Settings menu.

Direction pad
If the drone begins to drift while flying, use the direction pad to trim (stabilize) it.

(See page 17 for how to trim.)

R1
Press: Change LED color on drone and controller.

Press and hold: Prepare drone to flip during flight. Then, push the right joystick in the direction you want to flip.

⏻
Press: When connected to a computer by USB cable, this button switches between the remote control and LINK state, which is used for coding.

Press and hold 3 seconds: Power on / off when using AA batteries.

Right joystick
Left and right: Roll (move left and right).

Up and down: Pitch (move forward and backward).

P
Press: Go to next display mode screen.

Press and hold: Pair.
(See page 14 for how to pair.)

Taking care of your controller

Show the controller some care! It may look like a video game controller that can get tossed around, but do not treat it like one.

- Avoid dropping the controller
- Always **remove the USB cable** when not actively powering or programming the controller
- **Disconnect the USB cable gently** without bending the connector
- Be gentle when folding out the antenna and the handlebars
- Do not excessively twist back and forth any of the movable pieces
- When inserting batteries, **do not insert them backwards** or allow any pieces to fall inside the controller

Link state

The remote is connected but my code won't run.

1. Your remote needs to be in its "Link" state in order for you to program your drone. Press the power button, and you should see the words "LINK" appear on the remote screen.

2. If the controller does not switch into LINK state, try a different USB cable or USB port.

What does a disconnection look like?

Disconnect and re-pair

- Drone and controller LEDs will both be flashing
- Check the controller screen. It will display a message like “Searching...” and will be blinking red
- Most times, it may be a temporary disconnect

Practice (one at a time!)

- Press and hold the pair button on the drone
- Observe the controller screen showing a disconnect
- Use the “P” button on the controller to practice pairing

ROBOLINK

Pairing

- Power on drone and controller
- Press and hold the button on the bottom of your drone until the drone LED blinks yellow

- Press and hold "P" on your controller for 3-4 seconds. The controller should not be in LINK state

Notes on Pairing:

- Each drone should be paired to its controller out of box
- Drones and controllers are 1-1 pairing. A drone/controller pair may disconnect from each other if there was an update, bad crash, or the drone was put in an accidental pairing state (Pressing P)
- If you ever need to switch a drone/controller pairing, you can repair it by following the pairing process

ROBOLINK

Resetting the controller

Issue

The flight modes and settings on the controller are all different! I need to reset to the default settings.

Solution

1. Read this article to reset the controller to its original settings

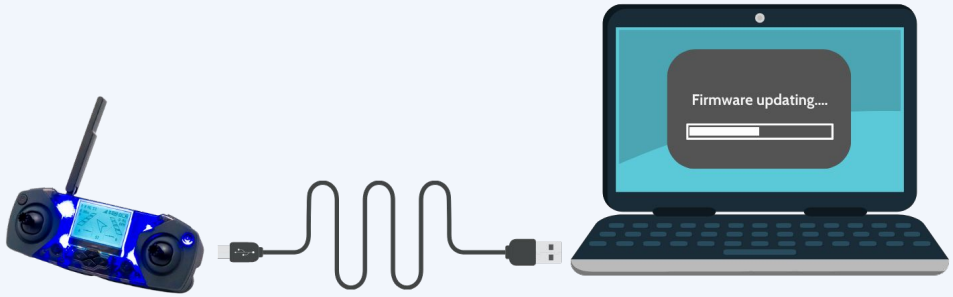
2. These are the default settings:
   a. P - position mode (enables the optical flow sensor for manual flight)
   b. N - normal flight mode (not in headless mode)
   c. M2 - Mode 2 flight controls
   d. S1 - Speed 1
   e. Sound on

Check your firmware

Occasionally there are **firmware updates** for your CoDrone EDU drone or controller. Periodically check that your hardware is up to date, especially if this is your first time using the drone.

Reference the HelpDocs articles to learn how to check your version, and see if you need to update your **drone** and/or **controller**

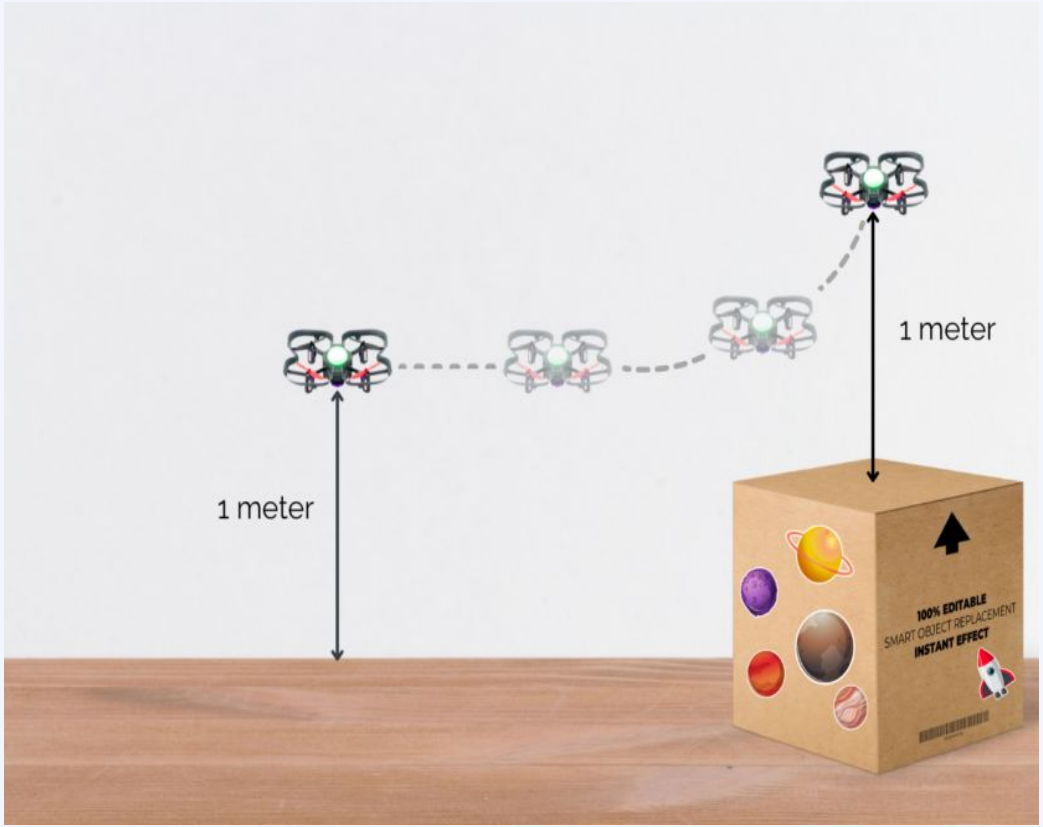
Online Firmware Updater Link: https://codrone.robolink.com/edu/updater/



3 Understanding Drone Behaviour

Upward drift?

- CoDrone EDU may drift up without throttle input. Why?
- CoDrone EDU's internal sensors are trying to maintain a constant height over the surface directly below
- The opposite can happen when taking off from a taller surface, and flying over the edge
- Always take off from the floor
- Move away any obstacles unless you are using the height sensor to do an activity over an obstacle



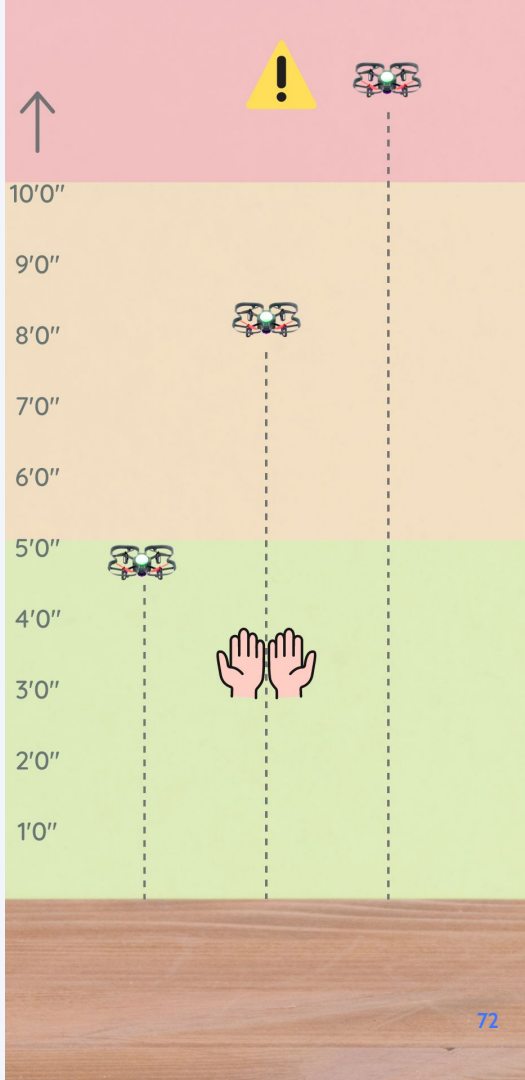
Drone care

Issue

If a drone crash lands from tall heights, it may cause irreversible damage to the drone circuit board.

Prevention

1. Use “land” and avoid using emergency stops unless necessary
2. Try to catch a drone whenever possible
3. Fly over mats or a light, patterned carpet and avoid hard surfaces
4. Build a DIY drone cage
5. Use caution when flying in auditoriums or gymnasiums with high ceilings



Calibration and trimming

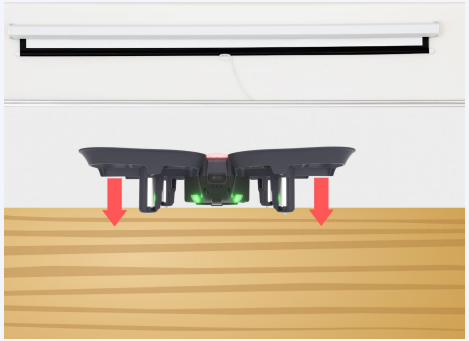
Issue

My drone is constantly drifting and trimming will not work.

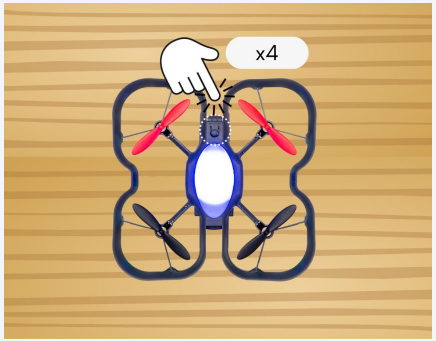
HelpDocs Article: [How do I stop my CoDrone EDU from drifting?]

Solution

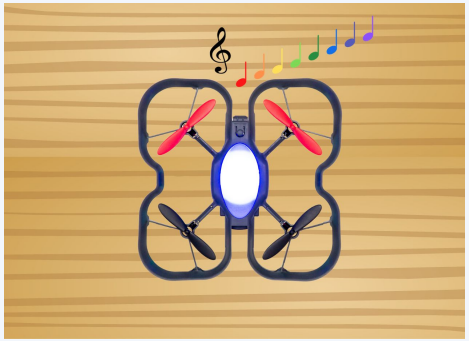
1. Check propellers for debris
2. Replace faulty motors
3. Reset the gyroscope



Place the drone on a flat surface.



Press the “action button” 4 times in rapid succession



Wait for the sounds!

Motion Calibration Error

Issue

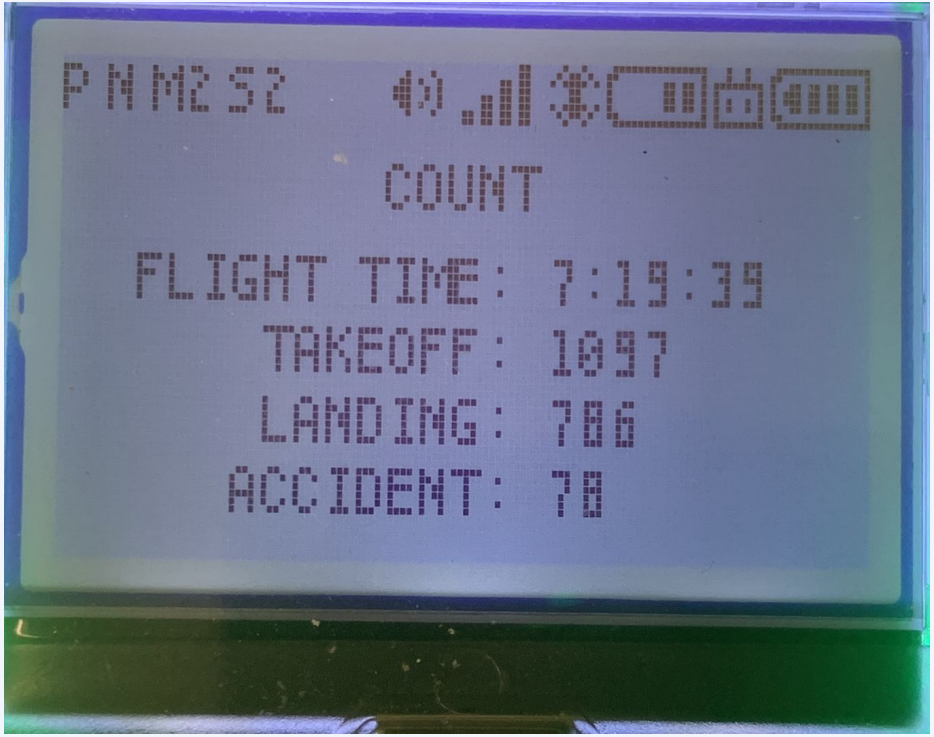
I have a drone that won't take off. The controller displays "[Motion] Calibrating Place on a Flat Surface" each time I try. I've already tried restarting both the drone and controller, as well as using quick takeoff.

Solution

1. If the controller says "motion calibration error", you will need a replacement

For more information as to how this occurs, please read our HelpDoc Article: [Why does my CoDrone EDU controller screen say "motion calibrating" when I try to take off?]

You can also always reach out to Robolink Support at support@robolink.com



1 crash every 5.6 minutes

Blinking yellow-green

Issue

I have a Code Drone EDU that is not pairing with its controller even after we have reset it.

Solution

1. Try to perform the pairing process with your drone and controller
2. If you drone still does not pair, try to pair that drone to a different controller
3. If that drone still does not pair to the new controller, then your drone's receiver is damaged.

Damage to the receiver will prevent pairing and is non-repairable.

For more information as to how this occurs, please read our HelpDoc Article: Why can't my CoDrone EDU pair anymore to a controller? It's blinking yellow-green.

You can also always reach out to Robolink Support at support@robolink.com

Troubleshooting Activity

Activity!

For this activity you will analyze 6 drones using the knowledge you have learned. See if you can spot if something is wrong.

HINT ~ Things To Consider:

- **Propellers**
- **Motors**
- **Batteries**
- **Frames**
- **Hidden Damages**

Questions?

Feedback:

Thank you!

Let’s stay in touch
@RobolinkInc