LEARN HOW TO FLY FPV WITH MULTIROTORS

We learned FPV flying (first person view) the hard way, crashes after crashes until we get it right. Later on I realized there are exercises beginners can do to gradually build up their skills and confidence. Also, there are also simple safety rules we should follow to avoid accidents and injury to ourselves and others.

In this article we will show you how to start and improve flying a drone in FPV (or multirotor if you prefer). If you are new to mini quad flying, make sure to check out our beginner's guide first.

Before jumping straight into FPV flying and racing, make sure you know how to fly your quadcopter from line of sight (LOS) first! In case something happens during your FPV session (e.g. losing video transmission), you can still remove your FPV goggles and land your quad in a controlled manner.

There are many ways to learn FPV. This guide is mainly based on our personal experience. If you have any other good ideas or suggestion please let us know in the comment.

Safety Rules

Before we start, we would like to mention some of the basic safety rules about flying FPV.

- Learn about the local regulations regarding RC model flying and FPV, for example here are the rules for FPV in the UK
- **Spotter** – A person that can watch out for approaching people or animals, and warns the pilot of any potential hazards they might not be able to see in their FPV goggles or monitor. They can also keep an eye on your personal belonging while you are totally immersed in FPV. Also note, it is illegal to fly RC models in FPV without a spotter in some countries, so do your homework and use common sense
- Fly in big open areas, far away from crowd of people, traffic, property especially airports. Grassy fields will be preferable in the beginning, not only for softening any crashes you might have but also it helps prevent sand from getting into your motors
- Range test your radio and video system when you arrive in a new environment, find out if there is any signal dead spots or interference
- A 500g object free-falling from high altitude can cause some serious damage, especially one with spinning blades. Please be sensible and do not attempt anything dangerous, again just common sense
- Pre-flight: Always carry out a hover test, fly your multicopter around and make sure it reacts to your sticks accordingly. Make sure all of your systems are working
- Post-flight: Check your gear after each flight, including feeling the temperature of each motor and ESC with your hand after landing. One hot motor means either it is failing, or the propeller is grossly unbalanced or badly bashed. Two or more warmer motors on the same side mean that the craft is not correctly weighted and balanced. Also you should be able to keep your finger on the motor for a few seconds without burning yourself, if not, the motor is too hot.

Things you should know before learning FPV

Flight Modes: Self-Level and Acro Mode

It's fine to start with Self-level mode at first as a beginner (aka horizon mode or angle mode), but eventually you would want to master acro mode as soon as your can. I can reassure you, it's the ultimate flight mode for the most smooth and free FPV flying experience!

Check out this post about the differences between self-level mode and Acro mode.

If you are using self-level flight mode, make sure it's tested and working beforehand. Setting up a buzzer (lost model alarm) activated via radio switch can be invaluable , and helps you find your aircraft if you crash into tall grass, a patch of forest or any hard to find places as you progress and start flying in more difficult areas.

Distance Estimation

It's harder to judge an object's distance when flying FPV rather than looking at something with your own eyes. This is due to the "fish eye" effect from FPV cameras, and the different field of view some camera lenses might have. That's why when you start, you want to go slower, and gradually build up the ability to make better distance estimations.

Quadcopter Simulators for FPV

There are many RC simulators (sim) that support multicopter models, some are even designed specifically for quadcopter FPV racing. It could be a good idea for someone just starting to gain flying experience on one of those sim, getting used to stick movements, different flight modes and trying new maneuvers, before learning on the real thing. Although it's not necessary, and one might not find it the most realistic experience, we do agree there are benefits to using a sim. One of those is not breaking your drone :)

Check out this post about FPV Simulators for Quadcopters.

Different Ways of Controlling TX sticks: Thumb, Pinch or Hybrid?

Here is a good discussion about the benefits of the different ways of holding the sticks of your radio transmitter: http://intofpv.com/t-stick-control-thumbs-only-or-pinching-with-thumb-and-index-finger

PID Tuning and RC Rate/Expo

It's very important to learn how to have your quadcopter's PID tuned for optimal flight performance. Also you should adjust Rate and Expo to suit your personal preference, which affects the precision of your

FPV Flight Exercises

Some preparation before we start. For the following exercises, it's best to have your FPV camera facing straight ahead if you are a beginner (no camera tilting). Some more advanced flyers tilt their cameras up so they can see the horizon while flying fast.

Always make sure that you have enough space to recover from error, and that the area is clear of people, animals or any other thing that may be harmed or damaged. Also make sure that the craft is far enough from yourself and your spotter.

Switch on self-level mode (horizon or angle mode).

Use some kind of marking, or tree as reference to help you identify position and distance.

1. Takeoff, Hover and Landing:

- Main goal: Practice throttle/altitude control.
- Sub-goals: Control drifting using roll and pitch
- Setup: Mark off about a 1m x 1m area to stay within
- Description:
    1. Takeoff and stay at 1-2 meters high for a few seconds while keeping within the marked area, then slowly come down to the ground and land
    2. Make sure the takeoff and landing is soft and gradual
    3. Don't cut your throttle too rapidly, make smooth adjustments. Hard landing can cause damage to your multirotor

2. Flying Out and Back:

- Goal: Practice forward flying, yaw turns, speed control, altitude control.
- Description:
    1. Take off and stay at about at 1 to 2 meters high
    2. Fly forward by pushing pitch stick forward, for maybe 20 meters or so. Keep your altitude constant at all time by adjusting throttle
    3. Start to slow down by pulling the pitch stick towards you, and come to a stop
    4. Turn around left or right using Yaw, accelerate again (pitch forward) to fly back to where you took off, slow down and turn around
    5. Repeat!
    6. You can increase speed and distance as you progress. Feel free to use roll as well to level your craft while making turns with yaw

- Main Goal:
  - More turn practice and making corrections to your path after turns
  - Getting used to flying in a bigger area
- Setup: Square off about 50m x 50m and mark it with a white ribbon or any thing else you think is right and visible
- Description:
  1. Fly along the sides of the square while trying to keep a constant altitude and pace
  2. Switch between clockwise and counter-clockwise directions

4. Circling a pole or tree while constantly facing it:

- Main Goal: Practicing yaw, roll and throttle control combined
- Description:
  - Circle a pole or a tree while continuously making roll, yaw and throttle adjustments to keep a constant distance from the tree and maintain altitude
  - Keep the object as centered in your view as possible

5. Firgure-8 around 2 poles or trees:

- Main goal: Gain much better coordination between both hands, you should be able to control all 4 axis better at the same time: throttle, yaw, pitch and roll
- Description:
  1. Fly in figure-8 while trying to maintain constant altitude
  2. It’s easier to have the 2 poles further away, it can be shortened later as you progress
  3. Try to turn around as smooth as you can
  4. You should begin to have some fun flying FPV

6. Sharp Turns:

- Main goal: Ability to make accurate sharp turns. This enables you to avoid some crashes. Sharp turns are also an effective way of braking.
- Description:
  - Fly towards one side of a pole or tree with some speed, and turn 180 degrees of yaw axis in a fast manner
  - You will need to use roll and pitch to help keep the aircraft level and stable, as well as fight some of the momentum

7. Fly through a Tight Gap or Air Gate:

- Main goal: Practice fast flying combined with fine stick control

- Description:
  - Starting at one end of the field, above the height of the gate, fly towards the gate and descend slowly to the height of the gate
  - Increase altitude once you've passed through the gate. Sharp turn and repeat

Having Trouble Learning to Fly FPV?

It's normal for FPV beginners to struggle at first. Luckily we wrote an article about how to improve FPV flying skills quicker.

Few last words:

Fly safe, be responsible, sensible and use common sense. More importantly, have fun!

If you want more help with your multirotor journey, or just love to share knowledge and help others feel free to join our Facebook group "Multicopters international" and our Multirotor forum "intoFPV.com".

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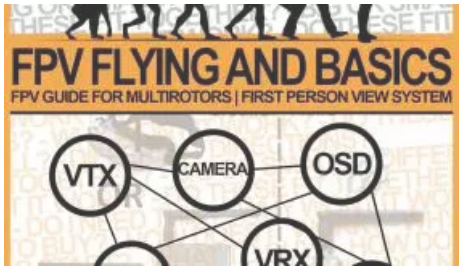

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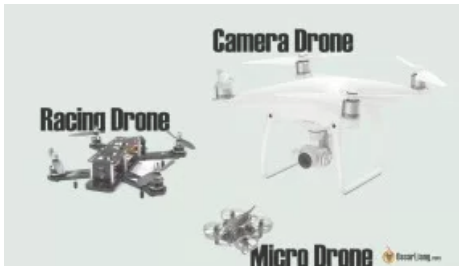

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