FC FIRMWARE FOR MINI QUAD

In this article we will briefly explain the different flight controller firmware options available for mini quad (FPV Racing Drones). We will take a look at the background of these FC firmware, as well as what they were intended to do.

Many of these firmware have the ability to fly fixed wing aircraft as well as other UAV's (unmanned aerial vehicles). Some even can stabilize ground vehicles and robots, but we are going to stay focused

Check out this guide about flight controllers.

The List of FC Firmware for Mini Quad

These Mini Quad FC firmware are covered in this article.

- Baseflight
- Cleanflight
- Betaflight
- iNav
- Raceflight
- KISS
- OpenPilot
- LibrePilot
- TauLabs
- dRonin

Baseflight

Baseflight was one of the very first widely used 32-bit FC firmware based off of the 8-bit Multiwii flight controller firmware. Today, Baseflight is not being updated and is widely considered to be an outdated/dead firmware. Despite all the controversy surrounding the software author, TimeCop, Baseflight did help bring us to some of the greatest software we use today, and is worth noting in my opinion.

- Baseflight GitHub

Cleanflight

Forked (branching out) from Baseflight, came Cleanflight aiming to be a “clean code” version of its predecessor for easier maintainability and future development. It quickly became a widely used and dependable flight control software and still is today. Since its beginning, Cleanflight has been forked into Betaflight and iNav. Many new features were added and tested from those, and merged back into Cleanflight to create Cleanflight 2.0 for a great well rounded firmware. Cleanflight has a broad flight controller targets support and a good following, definitely a solid firmware.

Betaflight

Betaflight was forked from Cleanflight to focus on the leading edge of new features and flight performance available for mini quads, hence the name **Beta**-flight. Today, this is probably the most widely used flight control software out there, and for good reason. It supports a very wide target range, a default tune flies very well and it is packed with features for serious racers, acro/freestyle pilots and beginners alike. It remains open-source, has a great following of contributors and is updated regularly. Betaflight is my own personal favorite and I very confidently recommend you give it a try if you haven't already.

However although with all the options in Betaflight make it one of the most flexible and powerful flight software, it is also one of the most awkward complex to setup, learn and use.

- Betaflight GitHub
- What Looptime Should I use
- Betaflight Airmode
- PID Tuning with Blackbox in Betaflight

iNav

INav, as the name implies, is geared more towards navigation and autonomous features such as flying Waypoint missions and Return to Home (RTH) functions. It forks from Cleanflight also and benefits itself with an open source code, good range of target support, and regular updates as well. If you are interested in more of that UAV/Drone style of flight, this is definitely an option to explore.

- iNav GitHub

Raceflight

Originally forked from Betaflight/Cleanflight, Raceflight focuses on pure racing and acro flight as well as being oriented around F4 flight controllers. Since its creation, Raceflight changed to closed source development and after some controversy, which is irrelevant to this article, the developers released **Raceflight One** with their Revolt flight controller and claim it is now completely free of any GPL (general public licence) open source code. Raceflight is well known for its smoothness, but be aware of its narrow target support and get the right flight controller.

- GitHub
- Raceflight Overview (2016)

KISS

Keep It Super Simple, is the concept used here. KISS was developed by Flyduino, which has been making multirotor components since 2011. It is a proprietary firmware (closed source) and somewhat dependant on hardware interfacing (a lot like Apple products). The KISS gear and software are widely used and dependable, as well as being kept up to date fairly well with where the hobby is progressing (closed-source development is slower than open-source).

The KISS GUI is much simplified compared to the Betaflight or Cleanflight GUI, leaving one of the quicker setup/configuration processes to get airborne. But the lack of options in its GUI can sometimes be more difficult to adjust problematic configurations. With that said KISS is one of best flying firmware out there for racing and acrobatic flying with unique characteristics. Many top pilots fly KISS and recommend KISS builds.

- KISS Homepage
- KISS FC Review

OpenPilot

One of the earliest open source FC firmware development for multirotors which influenced some major progressions in flight control firmware options. OpenPilot was discontinued and replaced by LibrePilot in 2015, but it is another firmware worth noting for what has become of its code.

LibrePilot

LibrePilot, forked from OpenPilot, focuses on research and development for use in many, many different applications, even robotics . While not as popular in the mini quad community, nor having support for as many hardware targets as other firmware in this list, it does show recent updates has a reliable team of developers and remains open source.

- LibrePilot website

TauLabs, another fork of OpenPilot focusing on autopilot UAV oriented research and development. Targeting professionals, researchers and and students alike, the project not only reaches out to major researchers, but offers an entry level platform with fast and easy setup/configuration for any group who has use for UAV's in their research. Again there is a limited target supports and a smaller following with mini quadcopters. But in my opinion I see this as a great "learning" firmware for a student project or trying something experimental with agricultural, air quality or whatever your brain can think up.

- TauLabs GitHub

dRonin

Last, but certainly not the least in this list is dRonin which is sort of the grandchild of OpenPilot. Its name says it all. With regular updates, open source, and a development team seeking to improve racing and acro flying performance, I see great potential here. They have developed an auto-tune mode that can custom tune PID's specific to your mini-quad build, as well as having the very quick and easy setup/configuration wizard. Its only downfall would be the somewhat limited supported FC targets, but it is a sophisticated list of flight controllers with great reviews.

- dRonin GitHub

Wrap up

As with most things related to the multirotor hobby, everything is relative and connected to a learning curve. Firmware will play a big role in what your mini-quad will be capable of doing, what features it will have, and which flight controller you should use to get the most out of it.

Do your homework (you're doing well if you have read this article) ;) and figure out what exactly you want to be able to do with your quadcopter.

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