

6-axis Multirotor Forward Flight Turns

The first type of turn that every multirotor pilot learns is a “pirouette” in which the rudder is used to point the heli in a different direction while hovering. These turns are usually limited to 90 or 180 degrees so they only take a moment to execute. A forward flight 180+ degree turn takes a bit more coordination and entails bumping the aileron while holding in rudder to carve nose first around the turn.

The first step is to establish forward flight, then hold in some rudder. Note, the amount of rudder largely determines how wide or tight the turn will be. A small rudder input leads to a wider turn, whereas a slightly larger rudder input leads to a tighter turn. Repeated brief aileron inputs (bumps) are then used to slightly bank the heli and help it to carve around the turn. The turn is then completed by centering the controls and resuming a stationary hover or continuing forward.

As a rule, the size of the aileron inputs during the turn go hand in hand with the rudder input. For example, when holding a small rudder input, use smaller aileron bumps, and vice-versa.

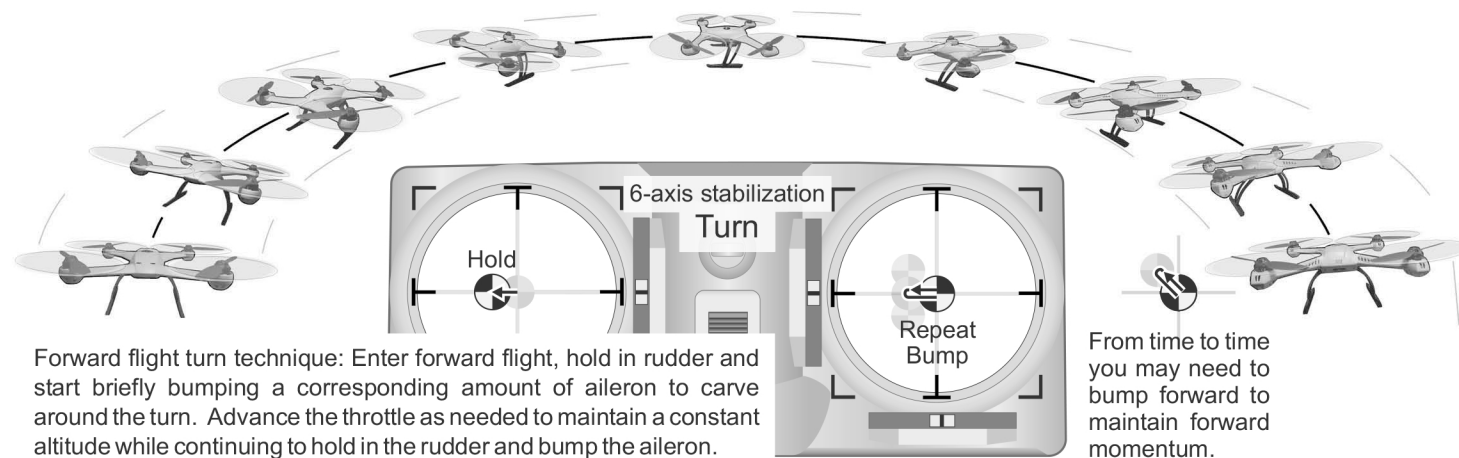
Forward momentum is key, otherwise the turn becomes just a stationary pirouette. Similarly, if you neglect to input enough aileron, the turn can become a stationary pirouette.

If the heli begins to lose forward momentum, it may be necessary to bump the stick forward in addition to bumping the aileron to maintain forward momentum. Conversely, you may need to pull back on the elevator if the heli picks up too much speed.

Forward flight turns are more dynamic than pirouettes, and thus it’s easier for a low-time pilot to get mixed up. That is why it is important to briefly bump the aileron to gradually coax the heli around the turn rather than holding the aileron in and risk over-controlling.

As a rule, basic multirotors will tend to lose some altitude whenever tilted/banked. Thus, be ready to add a little more throttle during forward flight turns (or just about any time the heli is tilted).

The amount of forward speed also has an influence on the size of the turn. A high speed turn uses more space whereas a low speed turn is much more compact. Note that slow speed turns are easier to perform in tight spaces, but are also prone to washing out. Faster turns tend to carve (track) better, but can also unravel faster. Thus, novice pilots are wise to start out at a moderate speed



Forward flight turn technique: Enter forward flight, hold in rudder and start briefly bumping a corresponding amount of aileron to carve around the turn. Advance the throttle as needed to maintain a constant altitude while continuing to hold in the rudder and bump the aileron.

From time to time you may need to bump forward to maintain forward momentum.

Forward Flight Turns with Active GPS Position and Altitude Hold

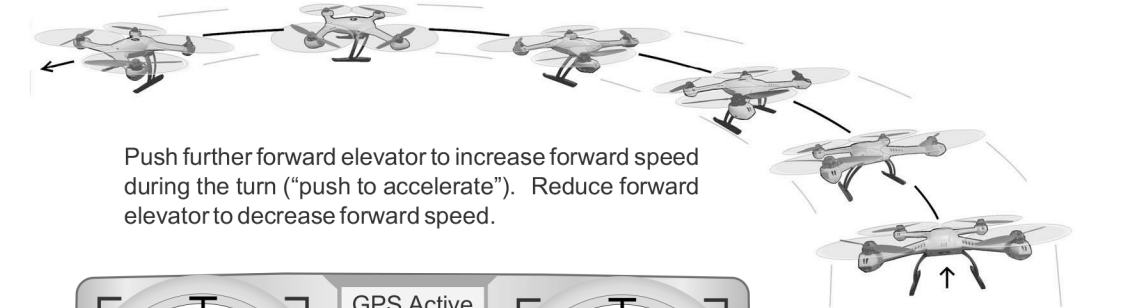
Watching a GPS equipped multirotor perform a nicely executed carving forward flight turn is quite satisfying, despite being relatively easy to perform.

The first step is to hold in forward elevator to establish some forward momentum, then simultaneously start holding in rudder and aileron in the same direction. Note that the size of the rudder input largely determines how wide or tight the turn will be, less rudder = more gradual turn, and vice-versa. To compensate for the stabilization technology, you will likely have to continue to hold in considerable aileron and forward elevator throughout the turn.

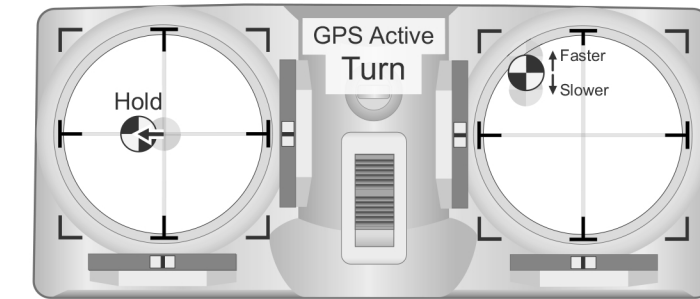
The main focus during the turn will be on controlling the forward momentum by pushing more forward stick to increase forward speed, or pushing less when you wish to slow forward momentum.

With experience, you’ll start adjusting the rudder in response to seeing the nose skidding too much into the turn (too much rudder) or lagging behind the turn (needs more rudder), as well as adding more or less aileron to help tighten or widen the turn.

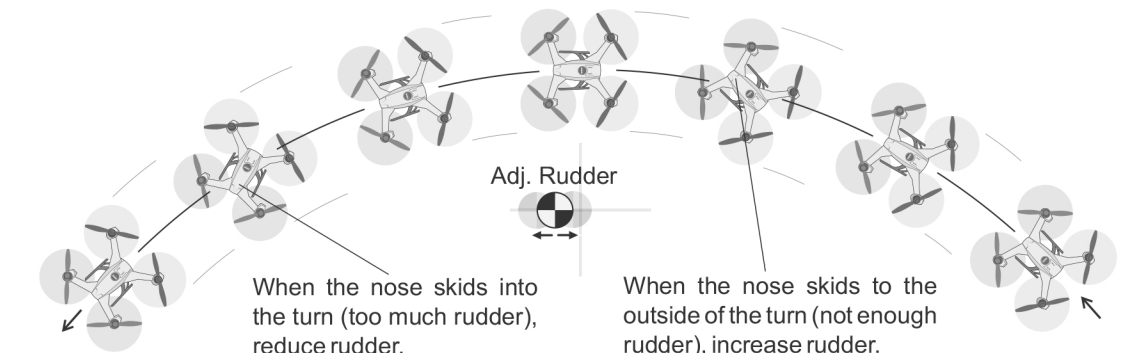
Lastly, if the throttle control is centered and the technology is working well, the heli should maintain the same height throughout the turn without having to make throttle adjustments. You can probably imagine how helpful that will be in the future when concentrating on filming what’s ahead of the heli.



Push further forward elevator to increase forward speed during the turn (“push to accelerate”). Reduce forward elevator to decrease forward speed.



Forward flight turn technique: Enter forward flight, hold in a small amount of rudder while holding a significant amount of aileron and forward stick to carve around the turn.



When the nose skids into the turn (too much rudder), reduce rudder.

When the nose skids to the outside of the turn (not enough rudder), increase rudder.