1. Quadplane
   1. Hovering mode
      1. Take-off procedure

Altitude (ground distance) sensors such as ultrasonic sonar or lidar work for distance typically greater than 20cm. Thus, as the UAV is on ground, ground distance measurement are not available. As a result, automatic take-off controlled by ground distance measurement are difficult to implement.

Here we choose the following procedure :

1. Manual throttle take-off, maintain the uav at an altitude between 0.95m and 2m
2. After a few seconds, the automatic altitude control gradually replaces the manual throttle
3. In case of abnormal functioning of the automatic altitude control, the pilot should be able to engage manual throttle control. The procedure is as following :

* Set thottle stick to zero
* Then, as soon as the throttle stick is pushed forward, the throttle is manually controlled

To summarize, the take-off procedure is :

* Take-off in manual throttle, set UAV altitude between 1,1m and 2m
* After 10s, set throttle stick to zero

In case of abnormal functioning of the automatic altitude control, the pilot can take manual throttle control with the throttle stick.

* + 1. Automatic landing

In automatic altitude control, the target altitude is control from the Tx and ranges can range between 0.8m and a user defined maximum altitude. If the altitude exceeds a user-defined failsafe altitude, the emergency landing mode is activated (see Section 1.1.3.2 ).

As the UAV reaches the minimum altitude (either the pilot sets target altitude to minimum value, or the emergency landing is activated), after a few seconds, an automatic landing procedure is activated. Automatic landing is achived by reducing throttle from current value to minimum value within a given time (a few seconds). Note that automatic landing does not rely on altitude measurement since they may not be reliable for small ground distances.

* + 1. Failsafe mode
       1. Failsafe activation

Failsafe mode will be activated in the following cases :

* + Low battery. If voltage is below a given threshold or used mAh above a given threshold during a few seconds
  + Radio signal lost
  + Altitude above the failsafe altitude
    - 1. Failsafe procedure

As failsafe mode is activated, the altitude control switches to automatic control and an emergency landing mode is activated. Target altitude is decreased from the current value at a rate of 1m/s.