**Energy consumption calculation**

**Purpose**

To calculate the energy consumption of a drone based on its physical parameters, movement, acceleration, and energy consumption of other components.

**Parameters**

1. **Battery Capacity**
   * Maximum energy available for drone operation.
   * Limits the duration and scope of activity.
2. **Weight**
   * Includes the drone frame, battery, payload, and additional components.
   * Affects thrust requirements for lift and motion.
3. **Movement**
   * **Hovering:** Energy consumed to maintain stability.
   * **Ascending/Descending:** Additional energy due to gravity (ascending) or drag (descending).
   * **Forward Motion:** Energy depends on velocity.
4. **Acceleration**
   * Horizontal and vertical acceleration add dynamic energy requirements during non-steady motion (e.g., take-off, speed changes).
5. **Antenna Requirements**
   * Power required for communication.
   * Depends on signal strength, range, and frequency of operation.
6. **Sensors**
   * Energy consumed by active sensors (e.g., cameras, LIDAR).
   * Increases with the number and type of sensors.

**The battery status function**

* **Input:** 
  + Battery capacity [mAh]
  + Drone parameters (weight, movement, acceleration, antenna & sensors requirements)
* **Output:**
  + Remaining battery capacity [mAh]
  + Remaining battery capacity [%]
* **Equations:**
  + Remaining battery capacity [mAh]:
  + Remaining battery capacity [%]:
  + Battery consumption per second:
  + The total drone current [A]:
  + Hovering current [A]:
  + Acceleration current [A]:
  + Antena current [A]:
  + Sensors current [A]:
  + Additional[A]:
    - User input – [A] needed for drone’s additional sensors (0 by default)