Weight Calculation

Component Weights

Below is the weight breakdown of the new components for the drone, along with a payload of 10L for fertilizers and sprinklers.

Component	Model	Weight (g)
Spraying System	Custom System	800
Frame	Carbon Fiber or Aluminum Alloy	1000
Motors (x4)	3508 700KV	100 (each) * 4 = 400
Propellers (x4)	Gemfan 15x6	30 (each) * 4 = 120
Batteries	Tattu 6S 22000mAh 22.2V 25C LiPo Battery Pack	1500
Flight Controller	Pixhawk PX4	40
Power Distribution Board (PDB)	Matek Systems PDB-XT90	50
Multispectral Camera Filters	1. Hoya R72 Infrared Filter 2. Schott RG630 Long-Pass Filter + Thorlabs FELH0750/Schott BG40 IR-Cut Filter (Combination) 3. Schott RG715 Long-Pass Filter + Thorlabs FELH0750/Schott BG40 IR-Cut Filter (Combination) 4. Wratten 58 Green Filter	250
Thermal Camera	Waveshare MLX90640	50
RGB Cameras (x5)	Raspberry Pi Camera Module 3 NoIR	40 (each) * 5 = 200
Communication Module	RFM95 LoRa Module	10
Microcontroller	Raspberry Pi 4/5	60
Minor Sensors	DHT22, BMP280, MH-Z19, HC-SR04	10 + 5 + 15 + 20 = 50
Electronic Speed Controller (ESC x4)	T-Motor F60A ESC	25 (each) * 4 = 100
GPS Module	Ublox NEO-M8N GPS	20
Sprinklers	TeeJet AIXR 11004-VP	200
Tank (HDPE)	10L Capacity	500

Payload (Liquid Fertilizer)	10 Liters (Assumed 1 kg/L)	10,000
TOTAL		**5,350**

Total Weight Calculation

Summing all component weights to get the total weight of the drone.

Drone Structure Components:

- Spraying System: 800g
- Frame: 1000g
- Motors (x4): 400g
- Propellers (x4): 120g
- Batteries: 1500g
- Flight Controller: 40g
- Power Distribution Board (PDB): 50g
- Multispectral Camera: 250g
- Thermal Camera: 50g
- RGB Cameras (x5): 200g
- Communication Module: 10g
- Microcontroller: 60g
- Minor Sensors: 50g
- Electronic Speed Controllers (ESC x4): 100g
- GPS Module: 20g
- Sprinklers: 200g
- Tank: 500g

Drone Structure Weight = 5,350g (5.35 kg)

Payload Components:

- Fertilizer in Tank (10L): 10,000g (10 kg)

Total Payload Weight = 10,000g (10 kg)

Final Total Drone Weight

- Total Drone Structure Weight = 5.35 kg
- Total Payload Weight = 10.00 kg
- **Final Total Drone Weight = 5.35 kg + 10.00 kg = 15.35 kg**

New Flight Duration Calculation

1. Estimate Power Consumption

- **Motors**: The 3508 700KV motors consume around **15-25A** each at full throttle with a **6S (22.2V)** LiPo battery.
    - Average current draw = **20A**

For a **6S battery (22.2V)**:

- **Power per Motor** = Voltage × Current
  Power per Motor = 22.2V × 20A = **444W**
    - For 4 motors:
      Total Power for Motors = 444W × 4 = **1,776W**

2. Battery Capacity and Power

Battery Specifications:

- **Model**: Tattu 6S 22000mAh 22.2V 25C LiPo Battery Pack
- **Capacity**: 22,000mAh (22Ah)
- **Voltage**: 22.2V

Energy Content Calculation:
Energy (Wh) = Capacity (Ah) × Voltage (V)
Energy = 22Ah × 22.2V = **488.4Wh**

3. Estimate Flight Duration

Flight Duration (hours) = Battery Energy (Wh) / Total Power Consumption (W)
Flight Duration = **488.4Wh / 1,776W ≈ 0.275 hours**
Flight Duration ≈ **16.5 minutes**

Summary

- **Total Weight = 15.35 kg**
- **Flight Duration (with 6S 22000mAh battery) = 16.5 minutes**