# Drone Specifications Data Sheet

---

## *Electronic Components*

1. **Flight Controller**
    - **Model**: Pixhawk PX4
    - **Features**: Supports autonomous flight, customizable with Ardupilot firmware, compatible with various sensors and peripherals.
    - **Interfaces**: UART, I2C, CAN, PWM
    - **Power Input**: 4.8V-5.4V
    - **Dimensions**: 81.5mm x 50mm x 15.5mm
    - **Weight**: 38g
2. **GPS Module**
    - **Model**: Ublox NEO-M8N GPS
    - **Features**: High-precision GNSS receiver, GPS + GLONASS support
    - **Interface**: UART (NMEA output)
    - **Power Consumption**: ~50mA
    - **Accuracy**: 2.5m CEP
3. **Battery**
    - **Model**: Tattu 6S 22000mAh 22.2V 25C LiPo Battery Pack with XT90 Connector
    - **Capacity**: 22000mAh
    - **Voltage**: 22.2V
    - **Discharge Rate**: 25C
    - **Weight**: ~1.5-1.8 kg per battery
4. **Power Distribution Board (PDB)**
    - **Model**: Matek Systems PDB-XT90
    - **Max Current**: 200A
    - **Output Ports**: 5V, 12V
    - **Weight**: 15g

5. **Multispectral Camera (DIY)**
    - **Filters**:
        - Near Infrared Filter (700-1000nm) – Hoya R72 Infrared Filter
        - Red Filter (620-750nm) – Schott RG630 Long-Pass Filter + Thorlabs FELH0750/Schott BG40 IR-Cut Filter (Combination)
        - Red Edge Filter (700-750nm) – Schott RG715 Long-Pass Filter + Thorlabs FELH0750/Schott BG40 IR-Cut Filter (Combination)
        - Green Filter (500-600nm) – Wratten 58 Green Filter
    - **Use**: Vegetation health monitoring (NDVI, GNDVI, LAI, etc.)
6. **Thermal Camera**
    - **Model**: Waveshare MLX90640
    - **Resolution**: 32x24 pixels
    - **Interface**: I2C
    - **Field of View**: 55°x35°
    - **Temperature Range**: -40°C to +300°C
7. **RGB Cameras x5**
    - **Model**: Raspberry Pi Camera Module 3 NoIR
    - **Resolution**: 12MP (4608x2592)
    - **Interface**: CSI-2
    - **Power Consumption**: Low to moderate, depending on usage
    - **Sensor**: Sony IMX708
    - **Field of View**: 75°
    - **Dimensions**: 25x24x11.5 mm
    - **Infrared Sensitivity**: Yes
8. **Communication Module**
    - **Model**: RFM95 LoRa Module
    - **Range**: 10-15 km (LOS)
    - **Frequency**: 868/915 MHz
    - **Interface**: SPI
9. **Microcontroller**

- **Model**: Raspberry Pi 4/5
- **Processor**: Quad-core ARM Cortex-A72 @ 1.5GHz
- **RAM**: 4GB/8GB
- **Interfaces**: USB, GPIO, I2C, SPI, UART
- **Operating System**: Linux (Raspberry Pi OS)

10. **Control Algorithm**

- **Software**: Ardupilot (Open Source)
- **Customization**: Minor modifications for specific tasks like crop monitoring and fertilizer spraying

---

## ***Sensors and Peripherals***

1. **Temperature Sensor**
   - **Model**: DHT22 (AM2302)
   - **Type**: Digital sensor (I2C)
   - **Temperature Range**: -40°C to +80°C
   - **Humidity Range**: 0-100%
2. **Atmospheric Pressure Sensor**
   - **Model**: BMP280
   - **Type**: Barometric sensor (I2C)
   - **Pressure Range**: 300-1100 hPa
   - **Altitude Resolution**: ±1 meter
3. **CO2 Sensor**
   - **Model**: MH-Z19
   - **Type**: NDIR CO2 sensor (UART)
   - **Measurement Range**: 0-5000 ppm
4. **Ultrasonic Sensor**
   - **Model**: HC-SR04
   - **Range**: 2cm to 400cm
   - **Interface**: Digital Trigger & Echo pins

---

## *Motors and Propulsion*

1. **BLDC Motors**
    - **Model**: 3508 700KV
    - **Voltage**: 11.1V-22.2V
    - **Thrust**: ~1.2 kg per motor
2. **Propellers**
    - **Model**: Gemfan 15x6
    - **Size**: 15 inches
    - **Material**: Composite
3. **Electronic Speed Controller (ESC)**
    - **Model**: T-Motor F60A
    - **Max Current**: 60A
    - **Voltage**: 2S-6S LiPo
4. **Sprinklers**
    - **Model**: TeeJet AIXR 11004-VP
    - **Flow Rate**: 0.5-1.0 L/min

---

## *Mechanical Components*

1. **Frame**
    - **Material**: Carbon Fibre/Aluminium Alloy
    - **Dimensions**: 1000mm – 1200mm
    - **Weight**: 1000-1500g
2. **Tank**
    - **Material**: High-Density Polyethylene (HDPE)
    - **Capacity**: 10L

---

## *Software and Control*

1. **Ground Station**

- **Control Software**: Ardupilot Mission Planner (PC-based)
- **Communication**: Telemetry link via LoRa/Radio
- **Features**: Waypoint navigation, live sensor data, automated flight control

---

## ***Environmental Data Integration***

- **Multispectral Analysis**: NDVI, GNDVI, LAI metrics for vegetation health monitoring using custom multispectral camera setup
- **Thermal Imaging**: Detection of heat variations for environmental analysis
- **GPS and Altitude Data**: For precise navigation and altitude holding, integrated with barometric and GPS data

---

## ***Endurance and Performance***

- **Flight Time**: ~25-35 minutes (depending on payload and weather conditions)
- **Max Payload**: ~10-12 kg (including sensors, cameras, and liquid tank)
- **Max Altitude**: 120m (above ground level per regulatory limits)
- **Range**: 10-15 km (with LoRa communication)

---

## ***Applications***

- **Precision Agriculture**: Crop health monitoring, nutrient, and pesticide spraying
- **Environmental Monitoring**: Temperature, CO2, and humidity tracking
- **Aerial Mapping**: High-resolution terrain and multispectral imaging