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Power Line Inspection with Drones

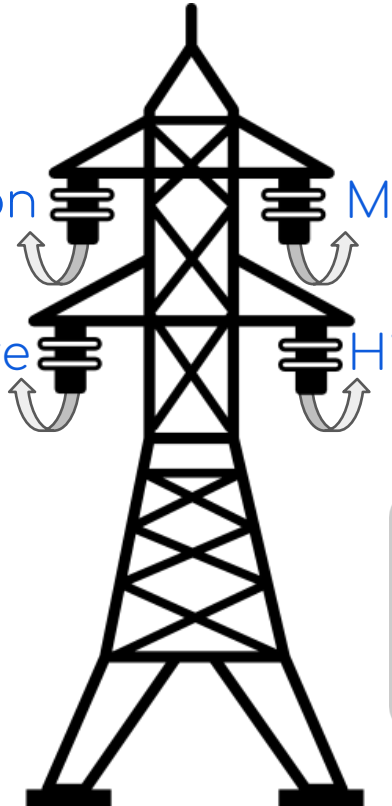
Efficient | Safe | Accurate

Why Drones for Power Line Inspection?

Faster data collection

Minimizes human risk

Cost-effective



High-resolution imagery

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Advanced Sensors Use For Data Collection :

DJI Zenmuse H20T

Thermal cameras

DJI Zenmuse L2

LiDAR

DJI Zenmuse P1

RGB cameras

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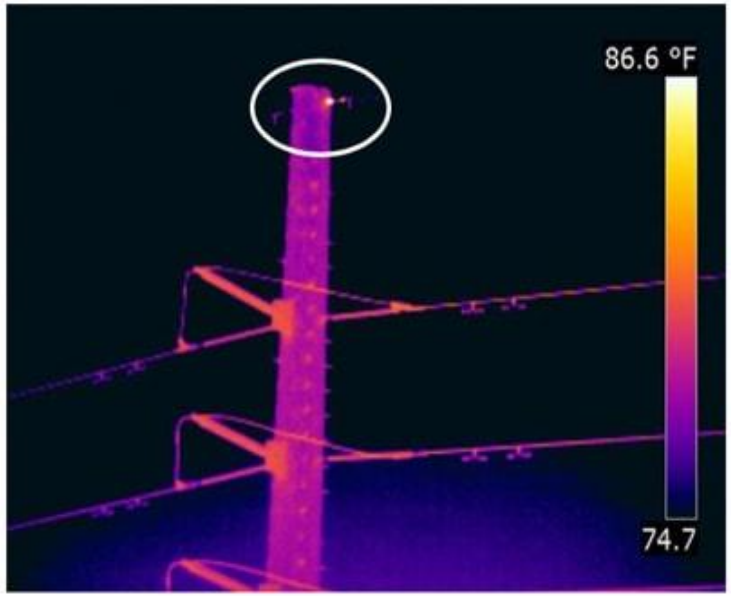
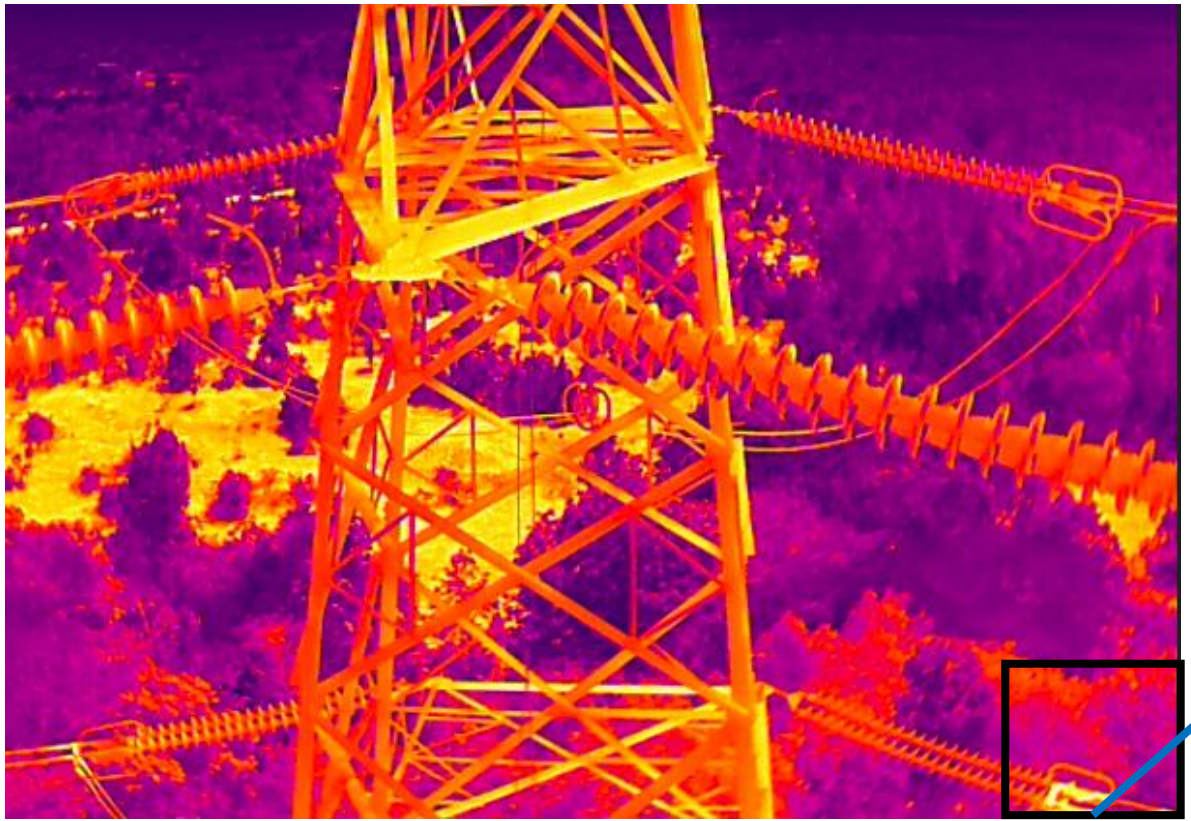
Precision Data



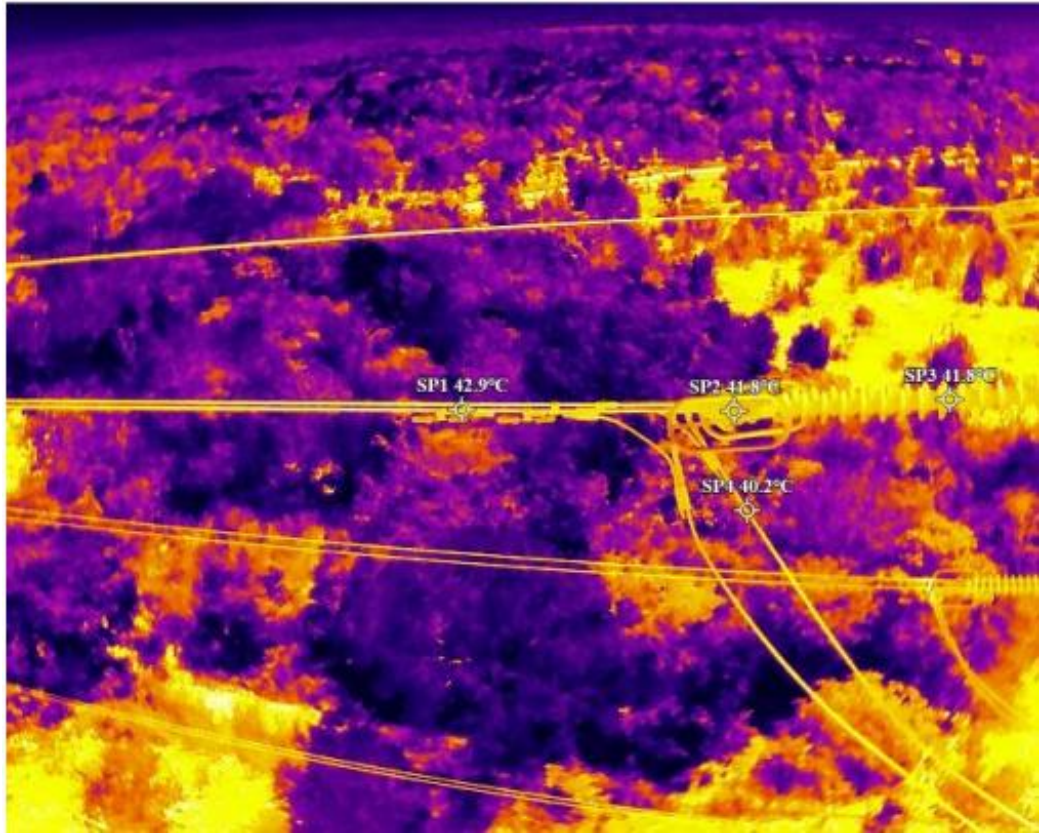
Hotspots

Thermal Hotspots at Joints



SQ 1	MIN	37.9℃
	AVERAGE	61.5℃
	MAX	85.0℃

Thermal Hotspots at Joints



SP1	VALUE	42.9°C
SP2	VALUE	41.8°C
SP3	VALUE	41.8°C
SP4	VALUE	40.2°C

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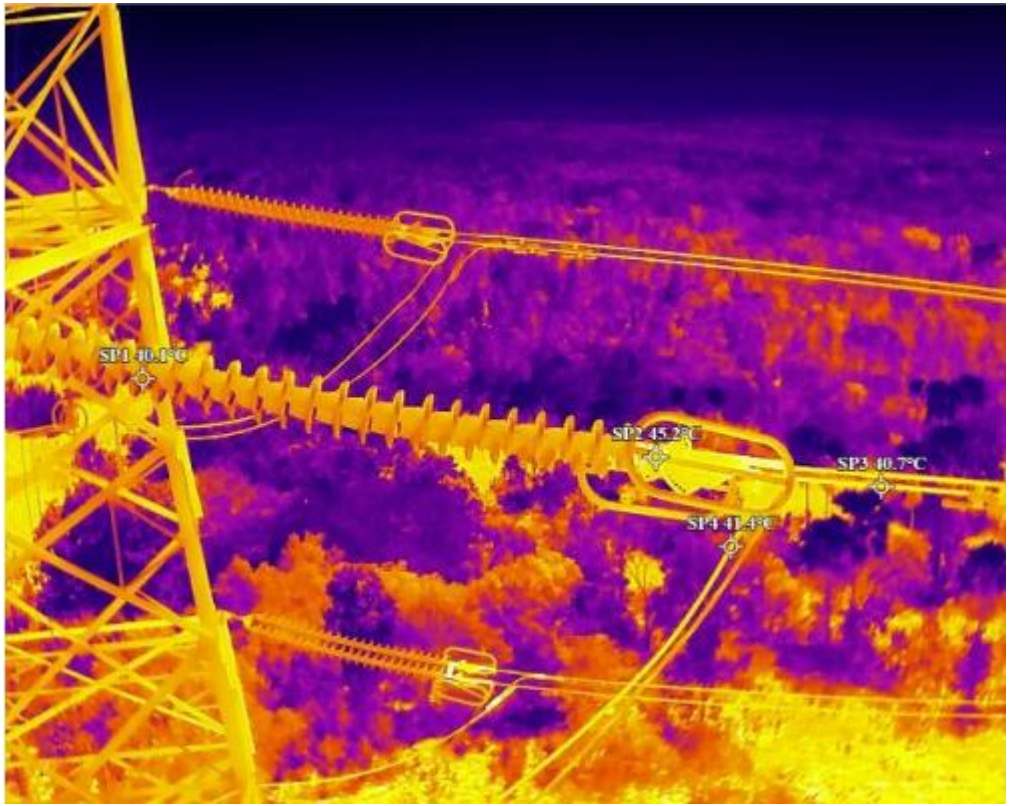
Thermal Hotspots at Joints



SP1	VALUE	40.1°C
SP2	VALUE	45.2°C
SP3	VALUE	40.7°C
SP4	VALUE	41.4°C

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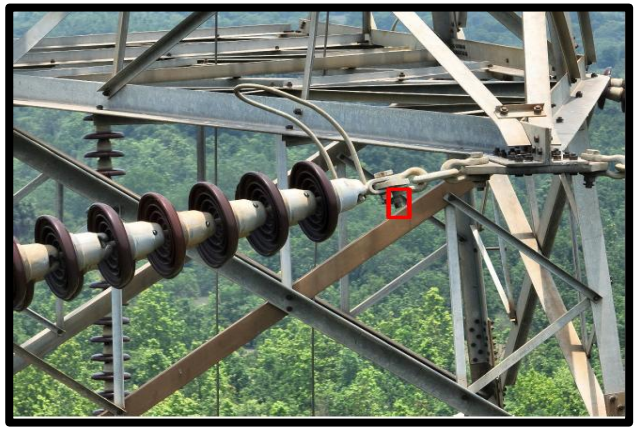
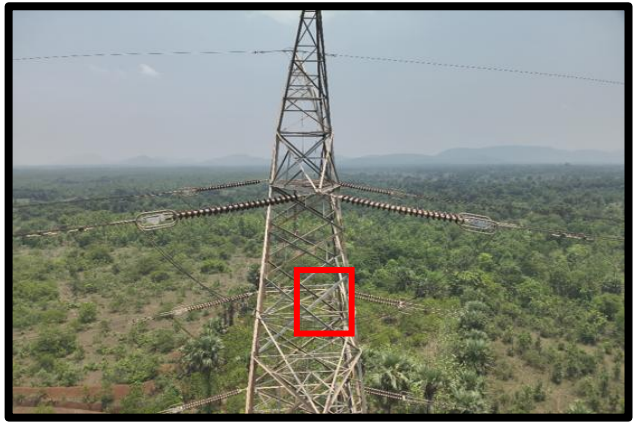
Insulators

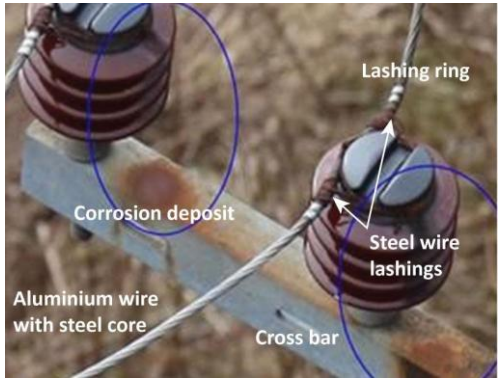


Tie Pin is Missing

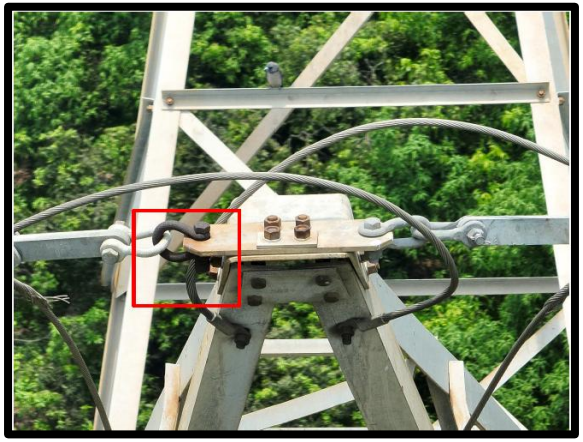


Bird Guard is Missing

Corrosion Detection



Cross Arms



Rusting on D Shakle

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Main Tower body above Cross Arm

Rusting on Footstep bolts

Tie pin is missing

Main Tower body above Cross Arm

Nut is loosen

Body part rusting

Vegetation Encroachment

Tower Leg

Vegetation near foot of the tower.

Tower Leg

Unwanted vegetation growth

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Main Tower body below Cross Arm Level

Unwanted vegetation growth and Dried Creepers

Live Monitoring :

Real-time fault detection.

Process Flow :

1. Pre-Flight Planning
   - Area mapping & flight path setup.

2. Inspection
   - Autonomous drone flights.
   - Data capture using sensors.

3. Data Processing
   - AI/ML-based fault analysis.

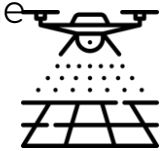
4. Reporting
   - Generate actionable insights.

Pre-Flight Planning :

This phase ensures the mission is well-structured and efficient.

- **Site Survey**: Assess the area to understand terrain, obstacles, and accessibility.

- **Flight Path Design**: Use software to create an optimized flight path covering the entire power line while avoiding obstacles like trees and towers.



- **Regulatory Approvals**: Obtain necessary permissions and ensure compliance with aviation and utility regulations.

- **Equipment Check**: Ensure drones are equipped with the right sensors (e.g., thermal, RGB, or LiDAR) and are flight-ready.

Inspection :

This is where drones perform the actual power line survey.

- **Autonomous Drone Flights**: Drones follow pre-programmed flight paths for consistent and thorough inspections.

- **Data Collection**:
  - High-resolution RGB cameras capture visual details like corrosion or physical damage.
  - Thermal imaging detects hotspots, overheating insulators, or conductor faults.
  - LiDAR identifies vegetation encroachment and sagging lines.

- **Live Monitoring**: Operators can view real-time data to identify immediate issues.

Data Processing:

- **Data Collection & Preprocessing**: Drones capture high-res images/videos, which are enhanced and augmented for better AI model training.

- **AI/ML Fault Detection & Classification**: AI models detect and classify faults (e.g., cracks, corrosion) based on severity, enabling predictive maintenance and efficient reporting.

Reporting:

- **Generate actionable insights** :In the final stage of drone-based power line inspection, the reporting will display detailed fault information, including the location, severity, and type of damage. It will also include 3D visual maps and heat maps, along with prioritized recommendations for maintenance and predictive insights for future issues.

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“Thank You”