India
SMART UTILITY
Week 2023

28 Feb – 04 March 2023 | New Delhi

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India Smart Grid Forum

DRONE BASED SURVEILLANCE OF OVERHEAD LT NETWORK

Speaker :   *MOUSAM DUTTA*

Distribution Engineer

CESC LTD.

Introduction

|	
Company name:	**CESC Limited**
Scope:	Generation & Distribution of electricity across 567 sq. km in Kolkata & Howrah in West Bengal
Registered Office:	CESC House, Chowringhee Square, Kolkata - 700001

CESC HOUSE - Head Office of CESC Limited
A heritage building built in 1933

- CESC is India's first fully integrated electrical utility company and it has been on an epic ride ever since 1899 in generating and distributing power

- **Consumer Base :** 3.4 million LT, 1700 HT -- including domestic, industrial and commercial users

- CESC has about **300 power transformers** in 18 Substations and in 122 Distribution stations

220 kV 11 kV 132 kV 33 kV 6 kV
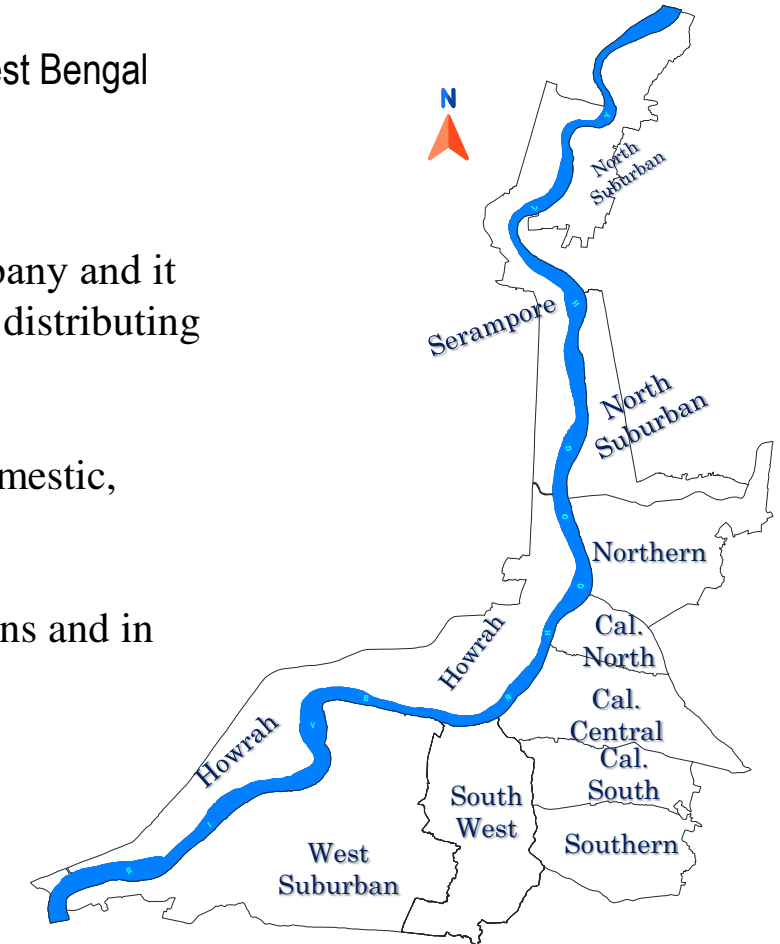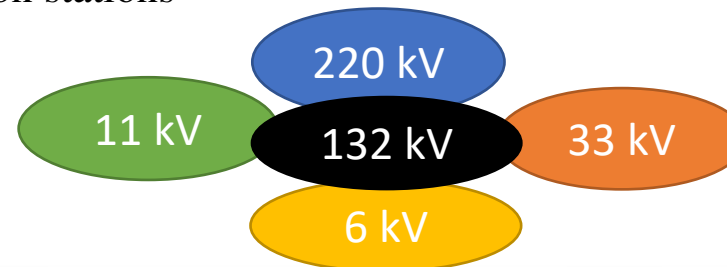
Context

✓ **Over 5700 circuit Km** of Overhead network spread over 567 sq Km

✓ The city of Kolkata has been struck with **repeated natural disasters** in the form of cyclones and deluge along with the Nor' westers

✓ Nor' westers and torrential rainfall significantly **affect the highly susceptible overhead conductors** in the network

✓ This project proposes a unique method of preventive maintenance of overhead LT network via drone based remote surveillance

Smart monitoring and maintenance of the network

✓ **Identification of vulnerable condition in overhead network that are invisible to human eye**

✓ **Proper identification of vegetation cover on overhead LT network**

Optimize manpower and budget usage to identify the weakest points in the network for carrying out network maintenance.

➢ SELECTION OF PARAMETERS

✓ **Hotspot in Jumpers and conductor joints**

✓ **Vegetation cover above overhead conductors**

✓ **Sag in conductor**

✓ **Non-optimal condition of overhead poles**

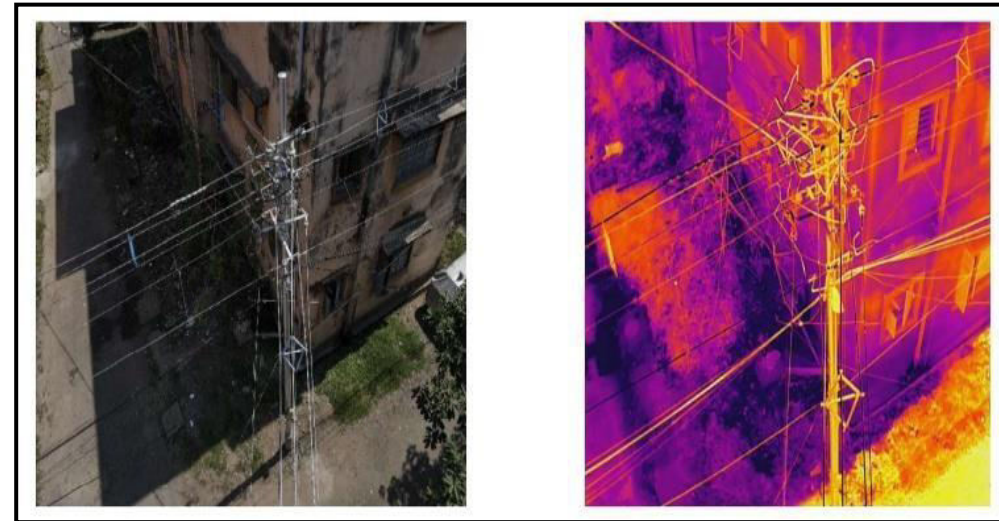✓ **Physical wear and tear in conductors**

SELECTION OF ROUTE MAP

IMPLEMENTATION
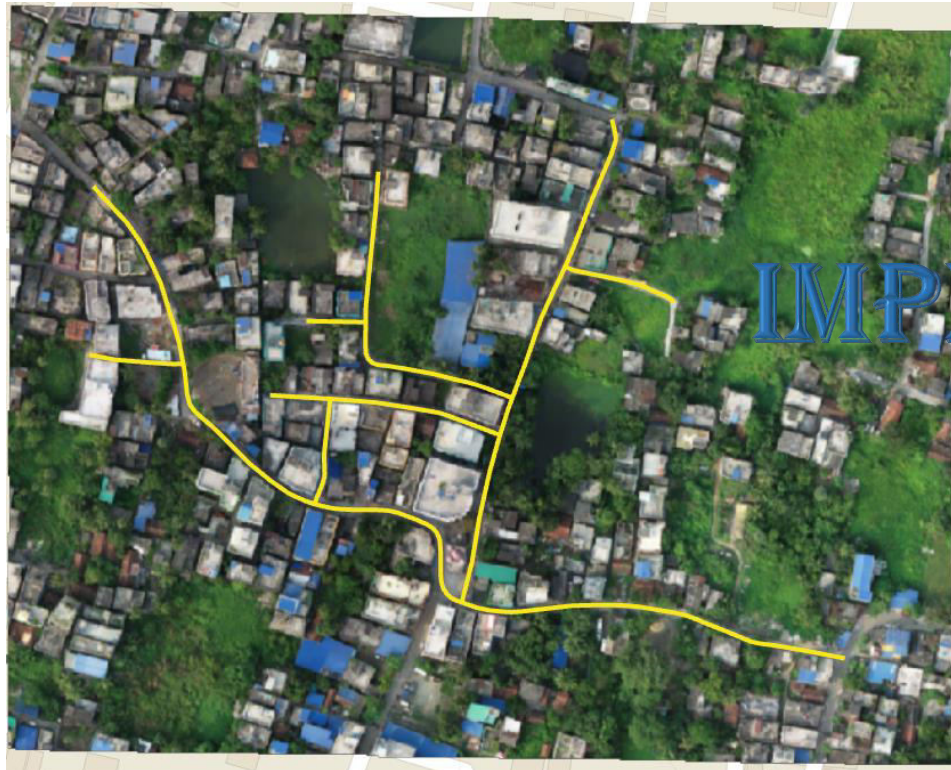
- Identification of overhead network points that are historically prone to faults during storms and peak summer
- Analysis of transformer loading data to identify electrically stressed overhead conductors
- Blending of data and human experience
- Consideration of existing constraints of DGCA prohibited areas

DATA CAPTURE, TRANSMISSION & STORAGE

IMPLEMENTATION

- Surveillance of LT network fed by identified distribution transformers- comprising of LT poles, conductors, jumpers, insulators etc along with vegetation layer covering overhead network

- Aerial photography with resolution greater than 40 Mega Pixel

- Thermal imagery of all assets

- Surveillance videos in both RGB and Thermal modes

- Drones with inbuilt memory cards

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Presentation on the Topic

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IMPLEMENTATION

DATA REPRESENTATION & ANALYSIS

- Data representation in ARU software by KESOWA- uploading of data in AWS cloud platform after 30 days
- Generation of exception reports

❑ The chief features of the platform of data representation are as follows.

- Orth mosaic Map

- Digital Elevation Model

- Vector Layer of GIS Data superimposed on the Map

- RGB and Thermal Videos and Images against each pole
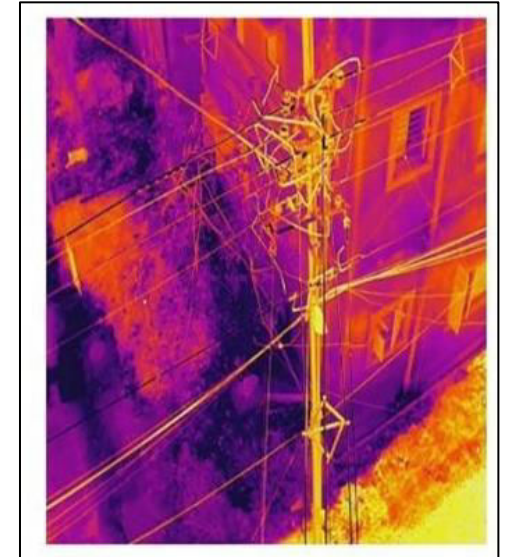
➢ **LIST OF FINDINGS**

✓ Maximum Temperature

✓ Tree Cover

✓ Other Actionable areas (e.g. presence of Hotspots)

✓ Sag Line

✓ Conductor joints

SAG Line

Actionable Category 1: High Temperature at Poles
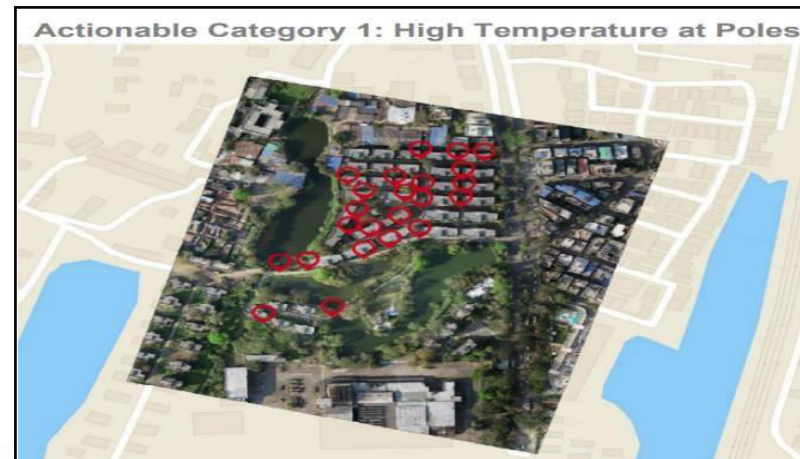
➢ INTELLIGENT PREVENTIVE MAINTENANCE

- Exception reports provide an action plan to attend the vulnerable areas on a priority basis

- Real time physical monitoring using surveillance videos

- Pre-emptive action in the form of attending vulnerable conductor joints, hotspots and vegetation management has resulted in a **37% reduction** in overhead faults in FY'22-23 w.r.t FY'21-22.

Key Takeaways/ Recommendations

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➢ PATH FORWARD

- Remote monitoring of HT and EHT overhead transmission lines

- Raising alert in water logged areas

- In the long term, machine learning algorithms can be embedded in the processing units of the drones in order to carry out daily monitoring of vital distribution system assets

Thank You

*For discussions/suggestions/queries email: **isuw@isuw.in***
www.isuw.in
Links/References (If any)