

# **AI initiatives to make Image / Video data Smart & Meaningful for Human & Asset Safety**

**- Arcturus Business Solutions**



# A BRIEF INTRODUCTION

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Arcturus Business Solutions is an Indian Start-up developing Artificial Intelligence & Virtual Reality software for Energy, Infrastructure & Manufacturing sectors.

## Our AI Initiatives:

- a) Real time Safety violation detection software “SafetyAI” from CCTV & Drone image/videos
  - ❖ Monitoring the Process & Safety’s Standard Operating Procedures (SOP) – Customized Solutions
    - Electrical Panel Maintenance during Shutdown
    - Overhead Crane Operations & related gesture
    - Man Machine Interface (MMI) during operations
    - 11/33 KV Distribution line maintenance



## ❖ Human Safety (Construction & Operations)

- Safety violation of PPE (8 different PPE)
- Fire & smoke
- Work at height, Entry in unsafe areas
- Vehicle Speed & Number plate

## b) Automated Anomaly Detection of Assets software **AlonAsset** from drone images

- Hotspots & temperature identification with location , segregation of the images
- Visual defect like missing nut bolts, damaged insulators etc.



# Safety AI: Safety Monitoring



## Problem: Human Safety



## Solution: SafetyAI

- Estimated work related accidents per year : 340 M
- Currently manual monitoring of workmen safety, hence impossible to monitor 24x7
- Any accident de-motivate the workforce & reduces the company's credibility

- Real time alerts for pre-emptive actions for human safety
- Automated handling of huge vision data in terabytes
- Customized AI solutions takes the safety monitoring to the next level of complexity and helps to maintain accident-free work place



# Salient Features – AI Safety

Real time monitoring - 24x7

Accuracy Level +95%

Range : 10mtrs -2 Kms

Connects multiple cameras



On-premise/cloud solution

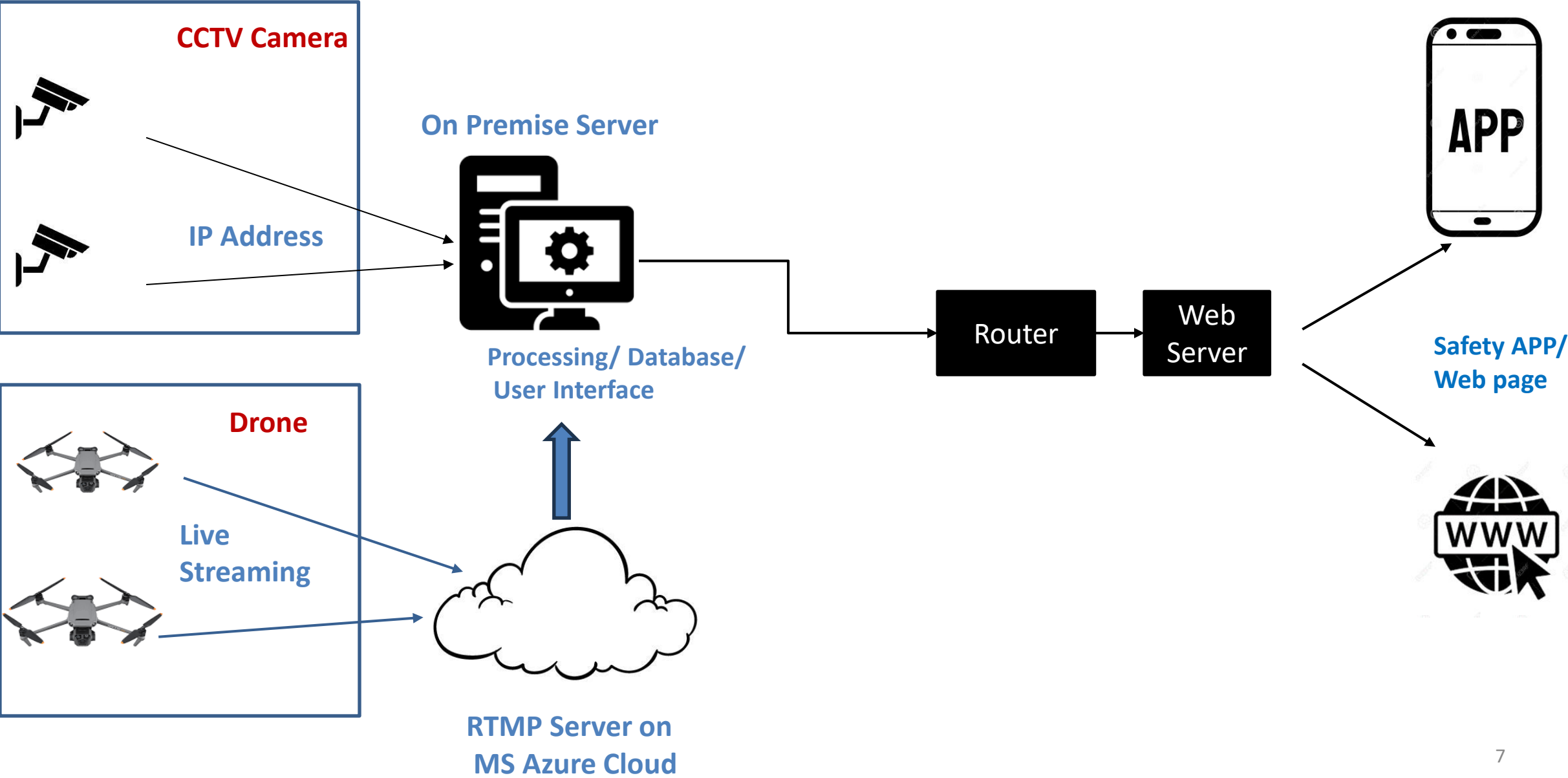
Alerts on APP & Webpage, speakers etc.

Uses existing/new Cameras

Customised Solution



# Network Architecture for AI Analytics





## CCTV Camera

- Minimum Camera resolution (2 MP) with image size as 1980 x 1080
- Analytics can be done on 60-65% of the range of the camera
- Sufficient illumination is requisite for both indoor & outdoor

## Processing Hardware

- Desktop/ Server i7 or Xeon with latest generation with high end Graphic processing Unit (GPU) based on no. of cameras feeds needed to be processed.

## Size of point of interest reqd. in Pixel per Mtr (PPM) based on DORI concept as per IEC EN62676-4:2015

- Helmet, Jacket, Harness, work at height: 100 PPM
- Boots, Gloves, Goggles, Leg guard, Hand guard: 200 PPM
- Fire & Smoke detection : 125 PPM
- Face Recognition : 250 PPM

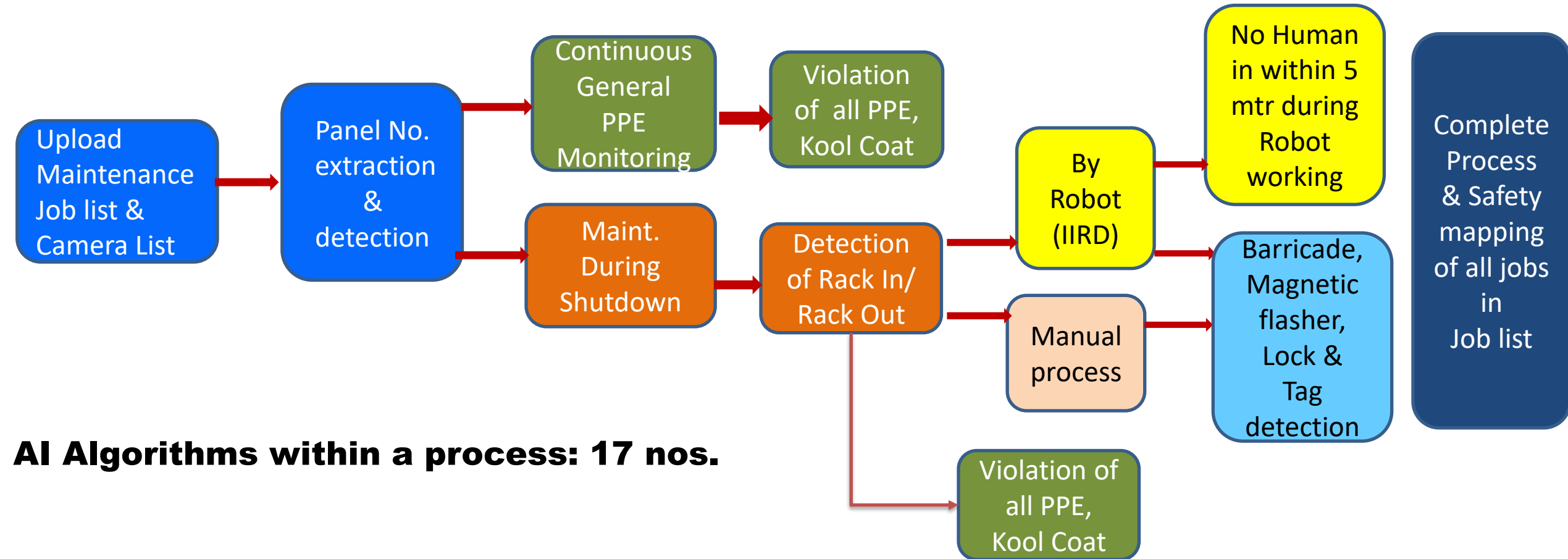


# Safety, Process & SOP Monitoring: Case Studies



# Case 1: AI based Safety SOP monitoring during Shutdown

## Electrical Panel Maintenance





# Electrical Panel Maintenance during shutdown



## Standard Operating Procedure (SOP) for HT panel maintenance

- Identify panels for maintenance from uploaded job list
- All person should wear Arc Suit, and other PPE
- If Robot is doing Rack In/Rack Out, no human should be available for 5mtr.

Identify panel from job-list



Arc Suit



Other PPE



Robot



No human within 5 mtrs if robot's light is ON





# AI detection during the process





# Process Job list

ADMIN

DASHBOARD

CAMERA MANAGEMENT

UPLOAD/RUN JOBLIST

HISTORY

CAMERA STATUS

VIEW RESULTS

ANALYTICS

MARK INTRUSION

USER MANAGEMENT

Powered by  
Arcurus Business Solution Pvt. Ltd.

Job Status

REF.ID	DEPARTMENT	AREA	JOB DESCRIPTION	PANEL	NO. OF ISOLATING POINTS	CAMERA NAME	IRRDRO	MANUALRO
69851	Blast Furnace	STOCK HOUSE	MCC takeup counte	4	1	BF-STOCK-HT-PNL	<div></div>	<div></div>
69851	Blast Furnace	STOCK HOUSE	MCC takeup counte	5	1	BF-STOCK-HT-PNL	<div></div>	<div></div>
69851	Blast Furnace	STOCK HOUSE	MCC takeup counte	17	2	BF-STOCK-HT-PNL	<div>1</div>	<div></div>
69851	Blast Furnace	STOCK HOUSE	MCC takeup counte	18	2	BF-STOCK-HT-PNL	<div>1</div>	<div></div>
69851	Blast Furnace	STOCK HOUSE	ESP Maintenance	2	1	BF-STOCK-HT-PNL	<div></div>	<div></div>
69851	Blast Furnace	STOCK HOUSE	ESP Maintenance	16	1	BF-STOCK-HT-PNL	<div>1</div>	<div></div>
69851	Blast Furnace	STOCK HOUSE	OGC01 M02 Base i	3	1	BF-STOCK-HT-PNL	<div></div>	<div></div>
69851	Blast Furnace	STOCK HOUSE	OGC01 M02 Base i	21	1	BF-STOCK-HT-PNL	<div></div>	<div></div>
69851	Blast Furnace	BLOWER HOUSE	Blower 6.6 KV SWE	2	3	BLOWER-HS-HT-P	<div></div>	<div></div>
69851	Blast Furnace	BLOWER HOUSE	Blower 6.6 KV SWE	7	3	BLOWER-HS-HT-P	<div></div>	<div></div>

## Identification with time & date

- Panel number
- Rack In /Rack Out
- Lock in/out Tag in/out
- Barricading
- Magnetic flasher

## Analytics

- Overall Maintenance time per panel
- Unscheduled maintenance from job list
- Any short cuts in process

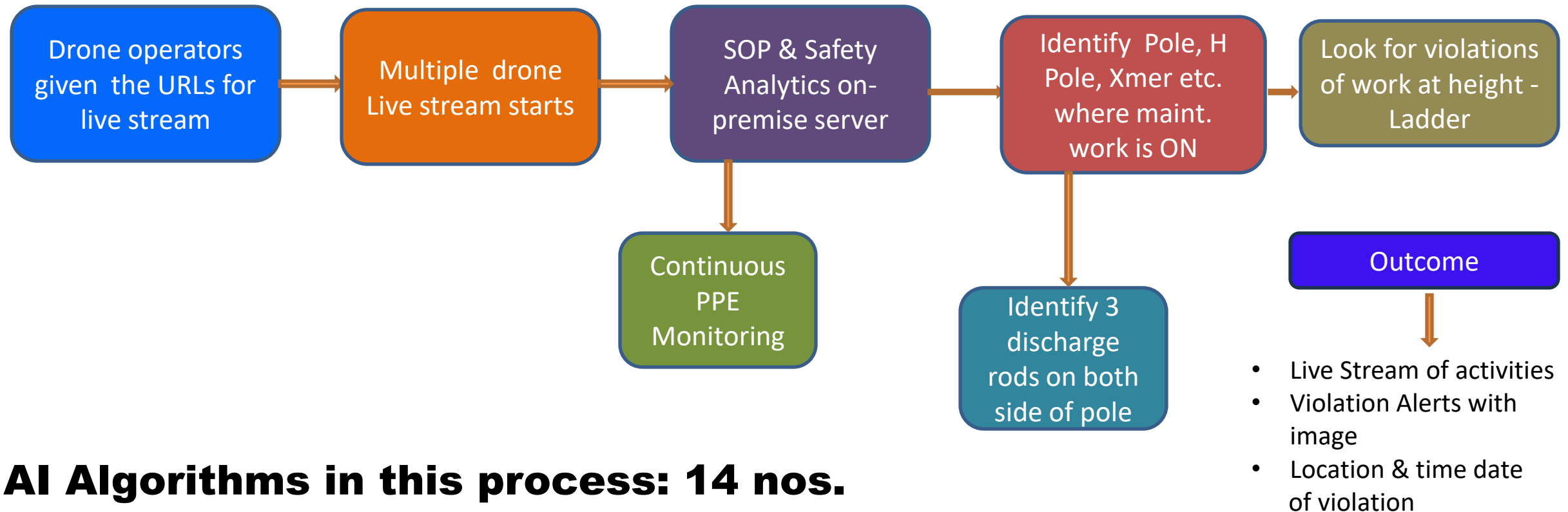
## Violation Detections

- All PPE including Kool Coat
- 5mtr human violation when robot is working



## Case 2: AI based Safety & SOP monitoring in Electricity DISCOMS

During 11/33 KV Lines maintenance from multiple drone livestream





# Different Detections





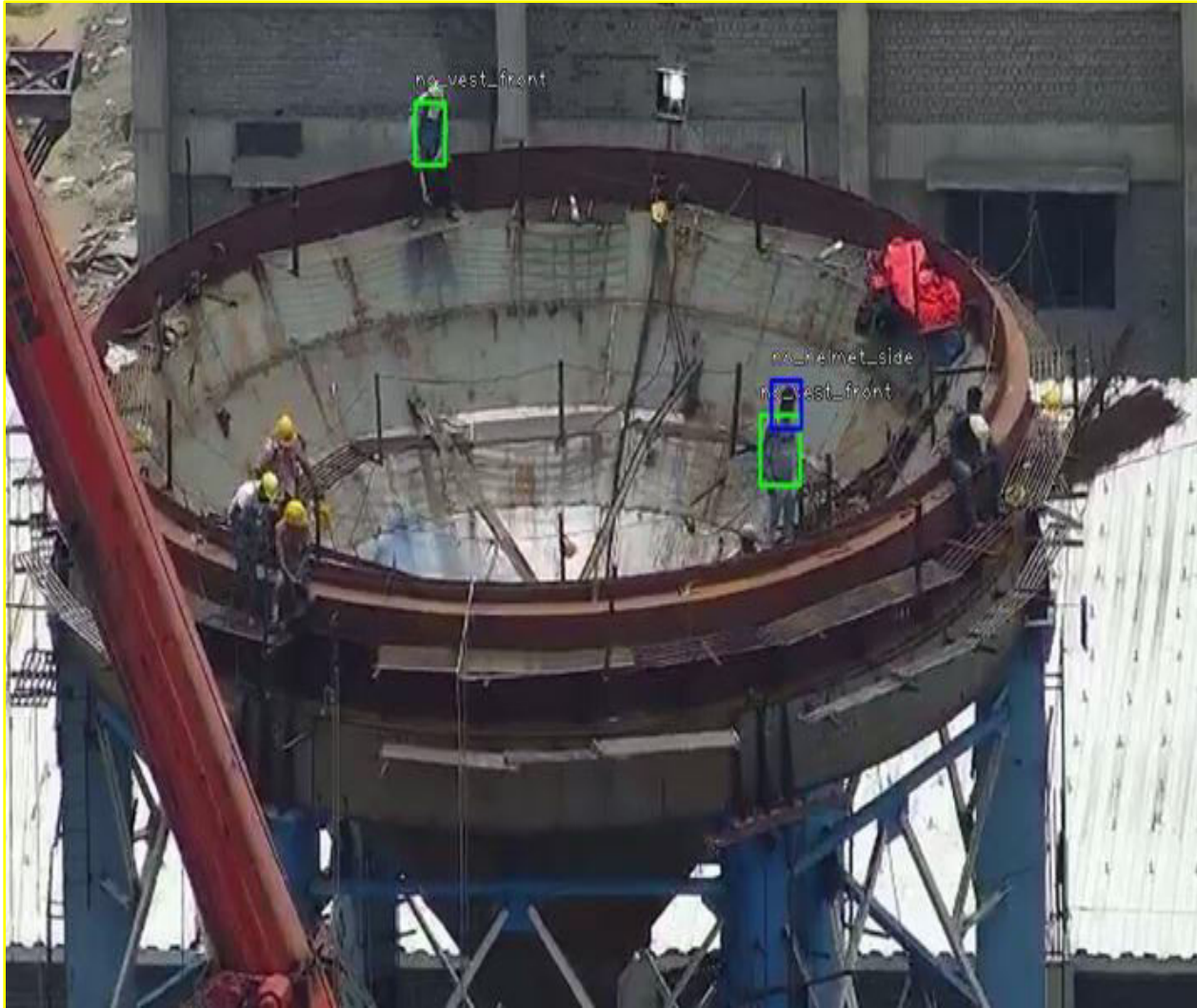
# FEW SAMPLES SAFETY DETECTIONS



# Construction Site

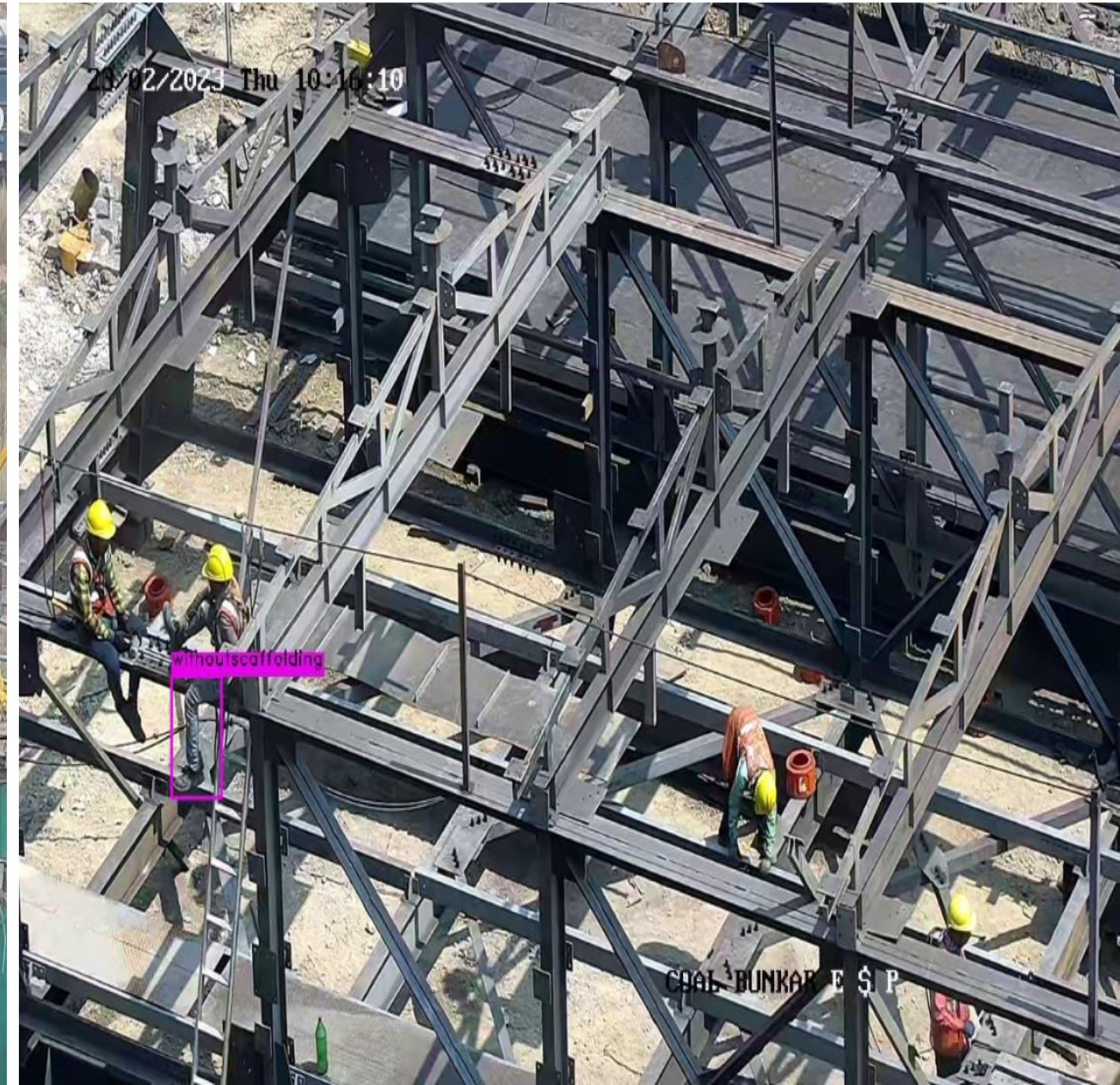
Camera distance 400 mtrs, height 25 mtrs

Camera mounting - 50 mtrs on tower crane





# Detection of violation at Height





# AI based Fire & Smoke Detection from CCTV camera

Open areas are not covered by fire & smoke detectors. Any small fire can become big in minutes, damaging the asset and human life.





# Defect Detection



## Problem: **Anomaly Detection**



## Solution: **AlonAsset**

- Drone images taken for the health monitoring, are in terabytes.
- Manually impossible to segregate the data and identify the defects.
- Scheduled Maintenance may get affected due to non-identification of the anomaly in time.

- An AI software for fast & automatic detection of different anomaly from drone image
- Users have to focus their time & energy to only the images identified with anomaly
- Preventive, Scheduled or Emergency maintenance can be planned better



# Anomaly Detection on Drone Images

AI based Anomaly Detection software for EHV Transmission Asset from drone image

Automates the segregation of the huge image data: Good & with anomaly

RGB images

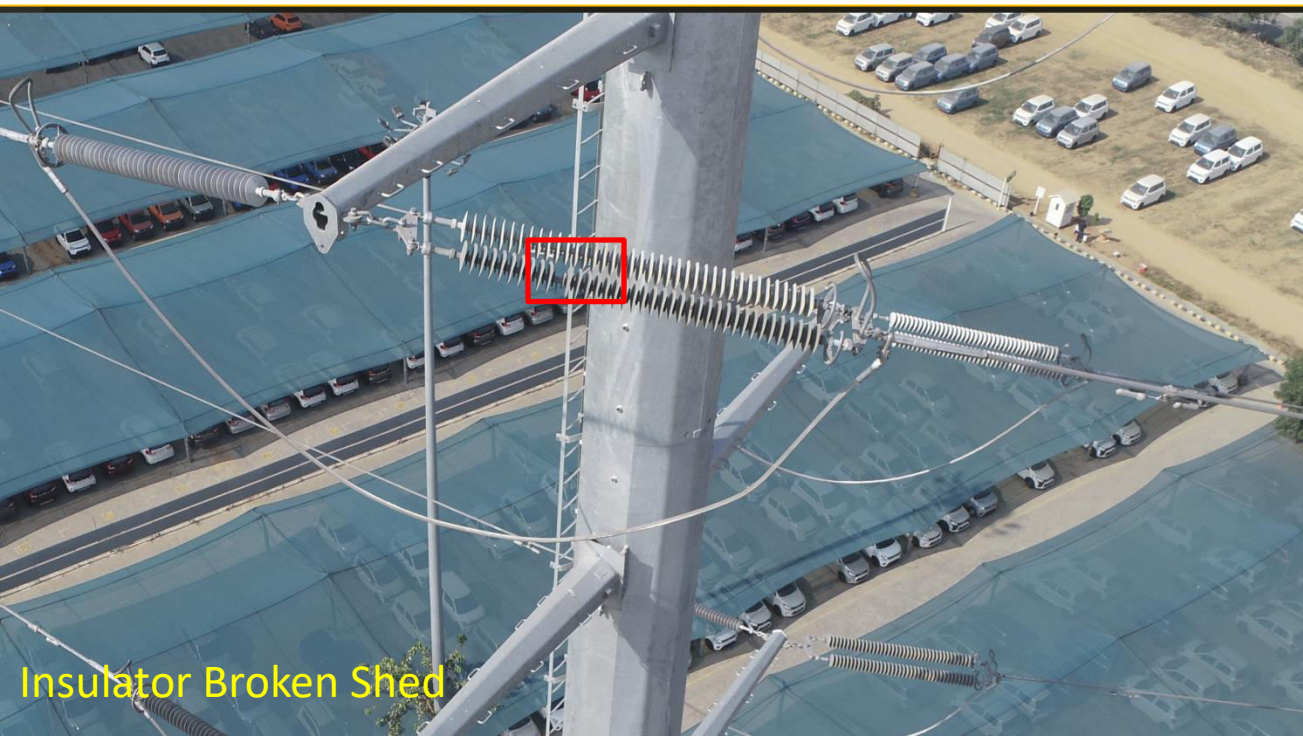
- Broken Insulators

- Rust

- Missing Nut bolts

Thermal:

- Hotspots with temperature



Insulator Broken Shed

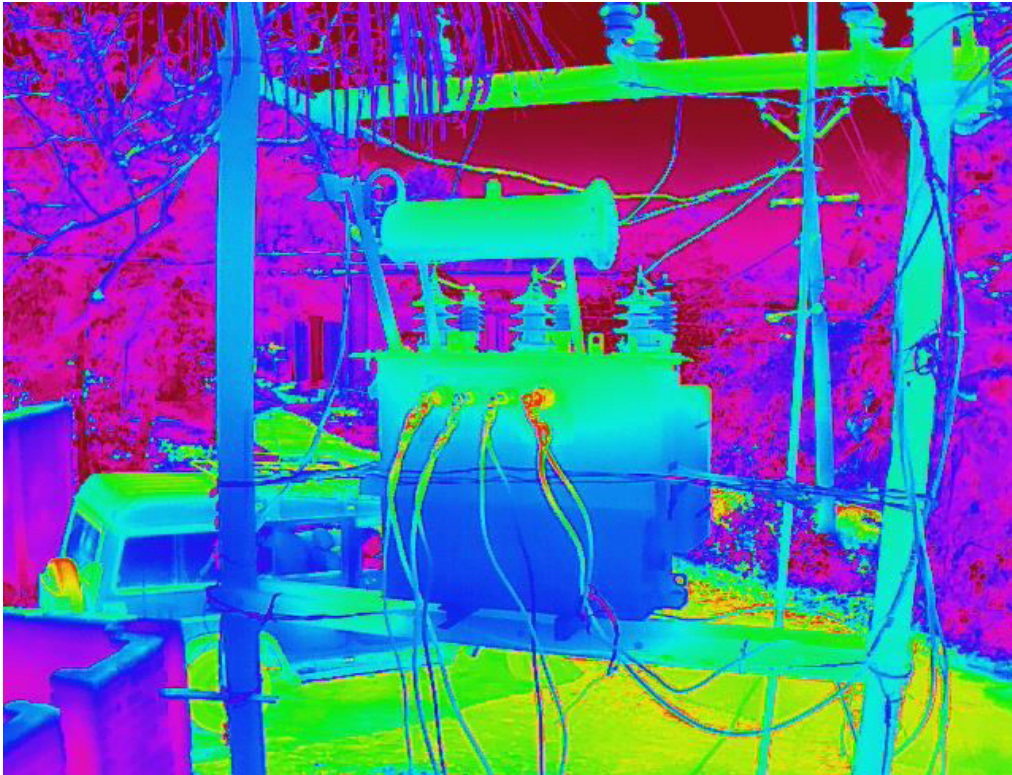


Vibration Damper Missing on OPGW

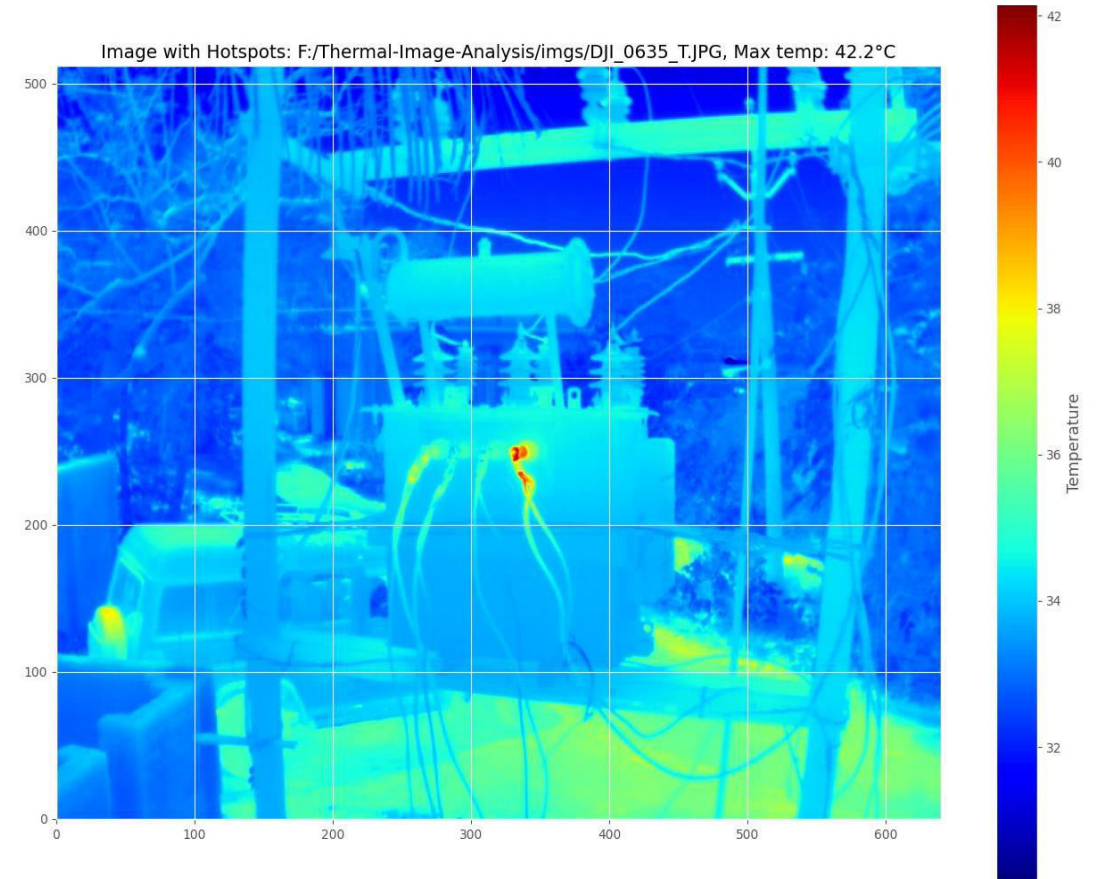


# Thermal Hotspots

Actual drone thermal image



AI based temperature & hotspot image



**Hotspot temperature is 42.2°C**



# Visually Empowering Business through the Power of Artificial Intelligence & Digitalisation

**THANKS !**

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# Detect, Observe Recognize, Identify (DORI) Concept

As per IEC EN62676-4:2015

For 4 MP camera with below size lens

DORI Distance	2.8 mm	3.6 mm	6mm
Detect (25ppm)	43m	80m	120
Observe (62ppm)	17m	32m	48
Recognise(125ppm)	9m	16m	24m
Identify(250ppm)	4m	8m	12m

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At the detection distance, the operator will be able to determine a human presence, although few details about that human will be visible.



At the observation distance, some characteristic details of the individual, such as distinctive clothing, can start to be seen.



At this distance, verify with a high degree of certainty whether an individual shown is the same as someone you know. License plates also become legible at this distance under good conditions.



The ability to positively identify a person beyond reasonable doubt. This level of detail provides sufficient image quality to identify an individual or clearly read a license plate.