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INDUSTRIAL TRAINING PRESENTATION

AERODYNE, CYBERJAYA

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INTRODUCTION TO COMPANY

AERODYNE & CORE BUSINESS

Foundation & Location:
- Established in 2014.
- Headquarters: Cyberjaya, Malaysia.

Key Services:
- **Drone Inspections**: Cost-effective asset management.
- **Geospatial Solutions**: High-resolution mapping and 3D modeling.
- **Data Analytics**: Converts raw data into actionable insights for automation.
- **Autonomous Drone Solutions**: Reduces human involvement in hazardous tasks.

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DT3 | Drone Technology
Data Technology
Digital Transformation

- **Drone Technology (DT1)**: Advanced drone systems for inspections.
- Global Drone-as-a-Service (DaaS).
- Includes operation planning, safety analysis, flight operations, and compliance

- **Data Technology (DT2)**: AI-driven analytics for actionable insights.
- AI-powered cloud-based asset management via Software-as-a-Service (SaaS).

- **Digital Transformation (DT3)**: Innovative solutions to optimize industries.
- Integration of digital technology into business operations.

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PRODUCTS OF AERODYNE

vertikaliti Suite

Autonomous drone systems for infrastructure inspections across diverse industries.

VertikalitiGRID

- Cloud-based powerline inspection using visual and thermal data.
- **LiDAR technology** for vegetation management.

VertikalitiTELCO

- Drone-based telco tower management and inspection.
- Tracks environmental compliance and reduces operational costs.

VertikalitiENERGY

- Cloud-based oil & gas infrastructure inspections.
- Detects gas leaks, corrosion, and performs ultrasonic testing.

VertikalitiWIND & VertikalitiSOLAR

- Structural inspection for onshore/offshore wind turbines.
- Provides prescriptive analytics.
- Drone-based solar panel inspection.
- Covers large areas with thermal imaging.

Autonomous Drone Technology & 5G Systems

•**Features**:

- AI-powered swarm and nested drone systems.
- 5G-enabled for low-latency communication and real-time data delivery.

•**Applications**:

- Quick deployment for ongoing surveillance.
- Provides situational awareness in dangerous environments.
- Reduces the need for human involvement in risky tasks.

Agrimor for Agriculture Solutions

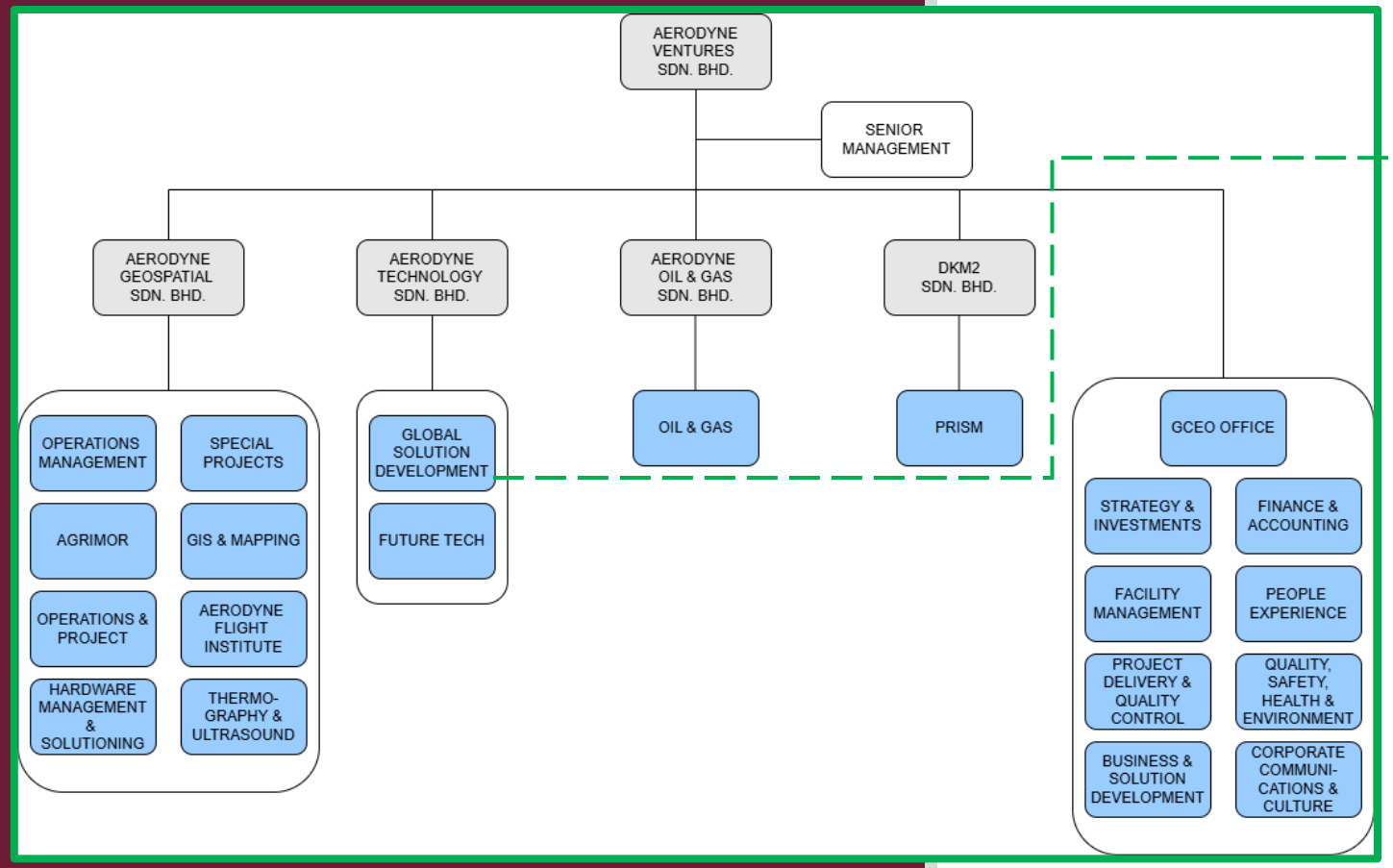
•Enhances crop yields and profitability through precision agriculture.

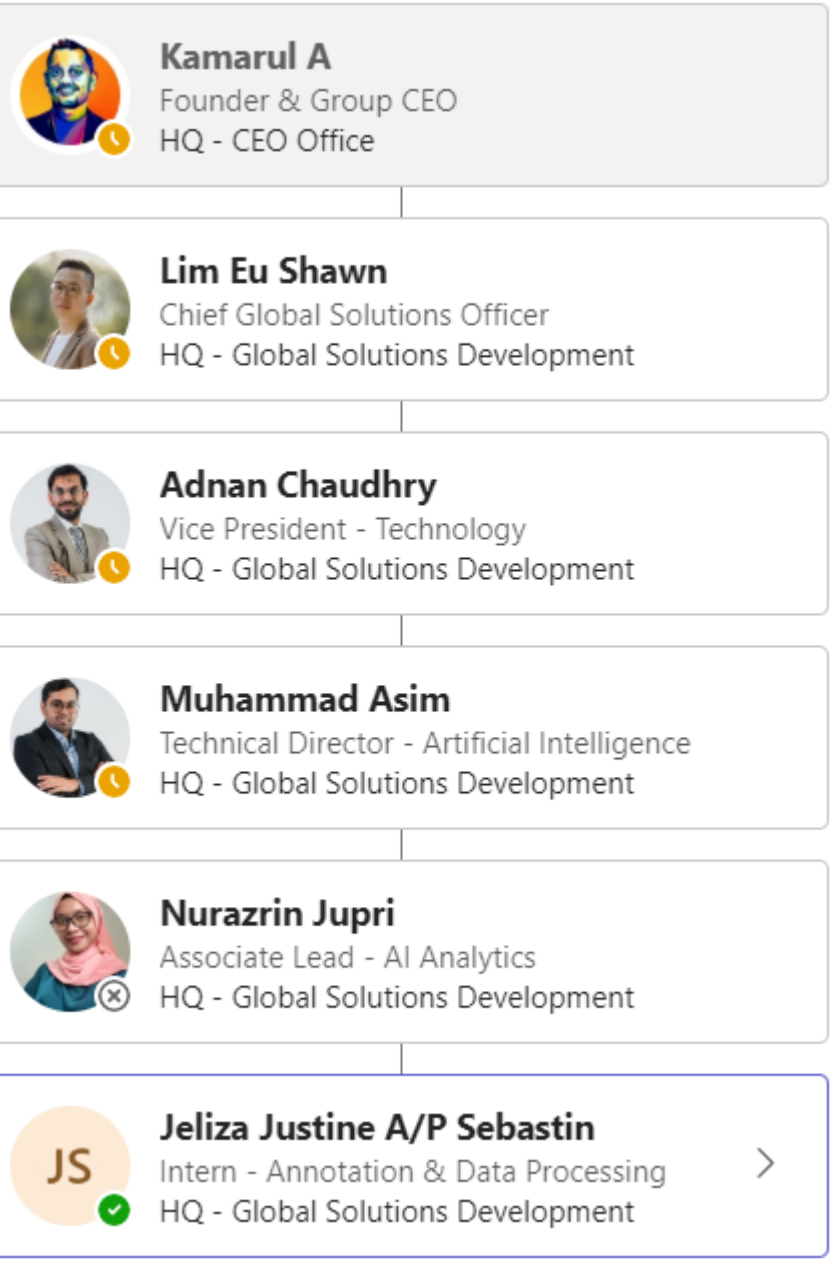
•Collects data on soil moisture, plant health, and yield estimation.

•Benefits:

- Sustainable farming with reduced traditional labor.
- Improves agricultural productivity.

ORGANIZATIONAL STRUCTURE OF AERODYNE





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SPECIFIC DETAILS ON PROJECT/TRAINING

- **Project Focus**: Telco Defect Detection.
- **Project Scope**: Data annotation for AI model development such as object/component/defect detection in Telco/Grid domains.
- **Main Software Used**: **CVAT** for data annotation.
- **Annotation Process**: Required labeling thousands of images, including complex frames with intricate patterns.

01

To accurately annotate images of telco towers to identify rust, mold and dirt defects.

02

To identify and accurately annotate defects such as mold, rust and dirt in given dataset which comprises of telco tower images.

03

To support the design of a machine learning model for the detection of telco towers defects under the Telco Defect Detection project.

Outcome:

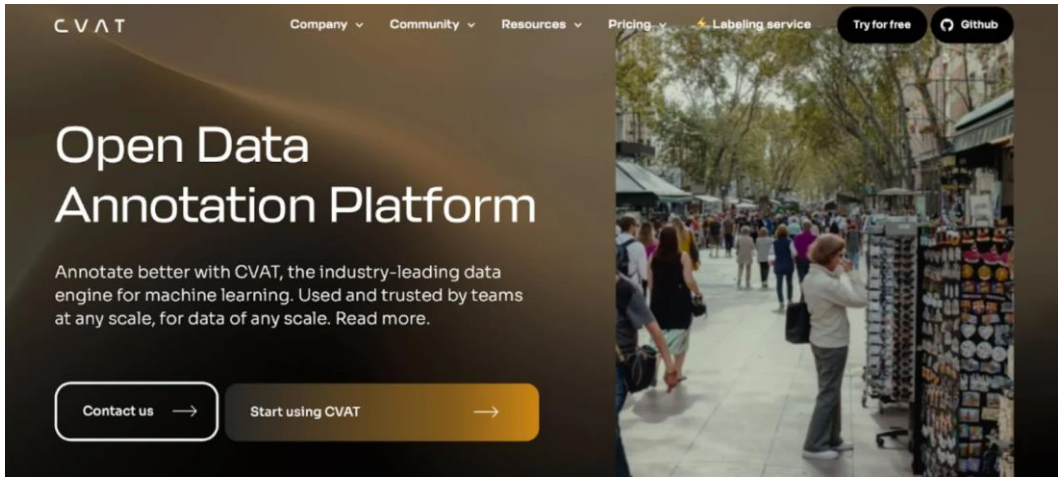
- ☑ Emphasized the application of **computer vision technologies** to enhance defect detection in telecommunication infrastructure.
- ☑ Improved **efficiency** and **accuracy** in defect detection through automation.

TELCO DEFECT DETECTION

- •Identify and label defects (rust, mold, dirt) in telecommunications tower images for training machine learning models.
- •Facilitate **faster structural analysis** and optimize **maintenance processes**.

Roles and Tasks:

- •**Defect Identification**: Label rust, mold, and dirt according to intensity levels and project guidelines.
- •**Region of Interest (ROI)**: Focus annotation only on relevant areas within the telco site.
- •**Annotation Process**:
  - Use **bounding boxes** and **polygons** to mark defects.
  - Validate annotations for **accuracy and quality** before model training.
- •**Tool Used**: **CVAT** for annotation and data labeling.

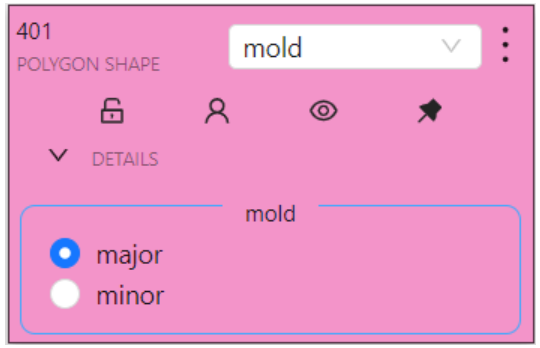


- •Annotated and reviewed **5,000 frames** related to telco sites.
- •Contributed towards **autonomous telco tower inspections**, aligning with Aerodyne's vision.

Annotation of Mold

Major Mold:
- Appears as **dark-colored patches or spots** on affected areas.
- Colors: High intensity of **green, brown, grey, or black**.
- Labeled as **"Major Mold"**.

Minor Mold:
- Appears as **lighter-colored, scattered, or powdery patterns** on affected areas.
- Colors: Low intensity of **green, brown, grey, or black**.
- Labeled as **"Minor Mold"**.

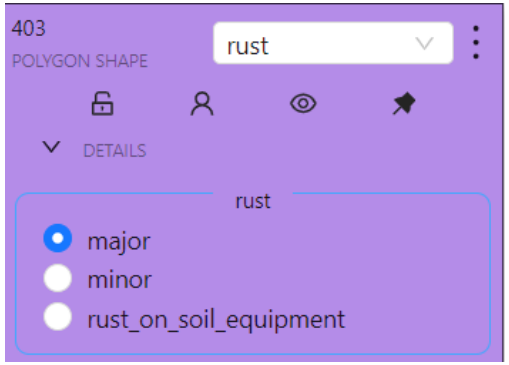


Annotation of Rust

Major Rust:
- **Thicker and darker** in appearance at the affected area.
- Colors: High intensity of **red or brown**.
- Labeled as **"Major Rust"**.

Minor Rust:
- **Thinner and lighter** in appearance at the affected area.
- Colors: Low intensity of **brown or yellow**.
- Labeled as **"Minor Rust"**.

Rust on Soil Equipment:
- Rust **mixed with soil or ground dirt**.
- Classified and labeled separately as **"Rust on Soil Equipment"**.



Annotation of Dirt

- Appears as **greyish coloration** on surfaces.
- Typically forms a **thin dusty layer**.
- Commonly found on structures like **antennas and dishes**.

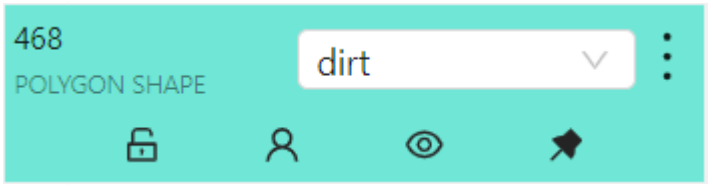
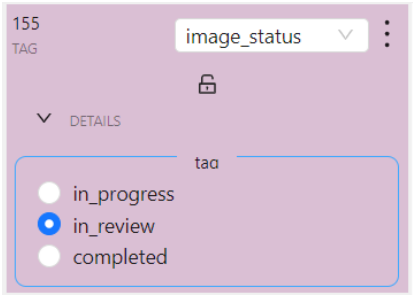


Image with polygon
Eg: Mold/Rust/Dirt appears

- Image Status
- Annotator Confidence



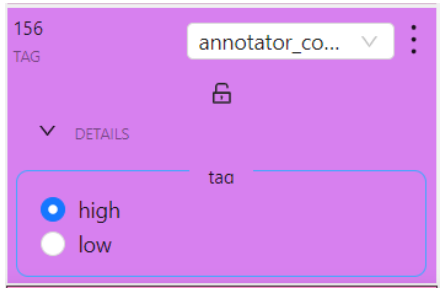
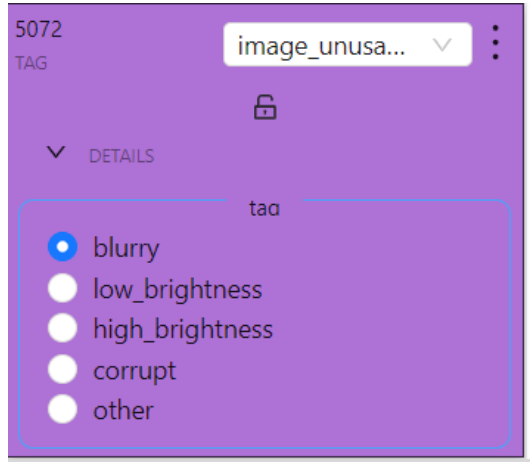


Image with unusable issue
Eg: no polygon, no bbox

- Image Status
- Image Unusable
  - Low Brightness
  - High Brightness
  - Corrupt
  - Blurry
  - Other
    Eg: Fog, no telco tower, there present a defect but there is an issue that make the image unusable

Image without polygon

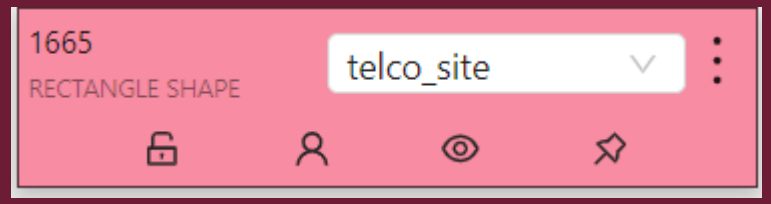
- Image Status
- Annotator Confidence



Purpose of ROI in Annotation:
•Focus annotations on significant areas of telecommunication towers.
•Speed up the annotation

REGION OF INTEREST (ROI)

Annotation Process:
•ROI was marked using bounding boxes in CVAT.
•Annotations adhered strictly to project standards.



REVIEW ANNOTATION TASK

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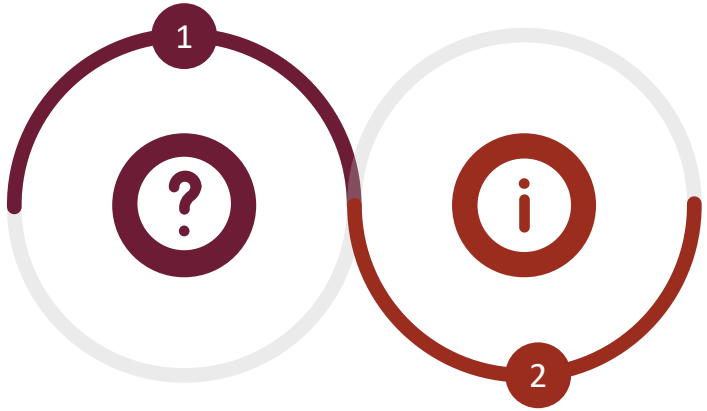
Verification
•Manually reviewed annotated datasets using Job IDs.
•Verified correct classification of rust, mold, and other defects within ROI.
•Checked for compliance with annotation guidelines.



Feedback
•Recorded feedback using Microsoft Loop.
•Highlighted deviations and suggested corrections.

HARDWARE

SOFTWARE

COMPUTER VISION ANNOTATION TOOL (CVAT)

CVAT

MICROSOFT TEAMS

EXCEL

MICROSOFT LOOP

NOTION

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TECHNICAL SKILLS

01 Data Annotation

- Hands-on experience in preparing high-quality datasets for training and testing machine learning models.
- Enhanced skills in object labeling, classification, and ensuring data consistency and precision.

02 Tools Proficiency

- **CVAT**: Improved proficiency in labeling image data for computer vision projects, effectively handling large datasets.
- **Notion**: Used for project documentation, team collaboration, and data security.

03 Computer Vision Knowledge

- Gained practical knowledge in object detection, feature extraction, and image preprocessing.
- Learned real-world applications in image and video analysis.
- Developed understanding of model training for computer vision tasks.

04 Analytics Workflow

- Exposure to end-to-end analytics processes: data collection, preprocessing, analysis, and visualization.
- Acquired skills to handle large datasets efficiently, transforming raw data into actionable insights.

SOFT SKILLS

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01 Time Management

- Balanced multiple tasks (annotation, reviews, collaboration).
- Prioritized job IDs and ensured high-quality results within deadlines.

02 Communication Skills

- Engaged in effective communication via Microsoft Teams for updates, meetings, and task tracking.
- Actively participated in discussions, providing and receiving constructive feedback during:
  - Analytics Stand-Up Meetings
  - AI Sprint Review Meetings
- Practiced clear communication with supervisors and team members.

03 Problem-Solving

- Resolved issues like incorrect labeling, missing annotations, and misdrawn defects.
- Provided feedback and one-on-one discussions for annotators to improve annotation accuracy.

04 Team Collaboration

- Worked in an open-minded, collaborative environment, ensuring smooth task progress and alignment with project goals.

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CONCLUSION

Contributed to the **Telco Defect Detection Project** by annotating data for rust, mold, and dirt defects in telco tower images using **CVAT**.

Gained practical knowledge in **data annotation**, **data processing techniques**, and **computer vision applications** in the industry.

Developed **teamwork skills** in a collaborative and positive environment.

Combined technical knowledge with professional workflow practices for real-world applications.


THANK
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