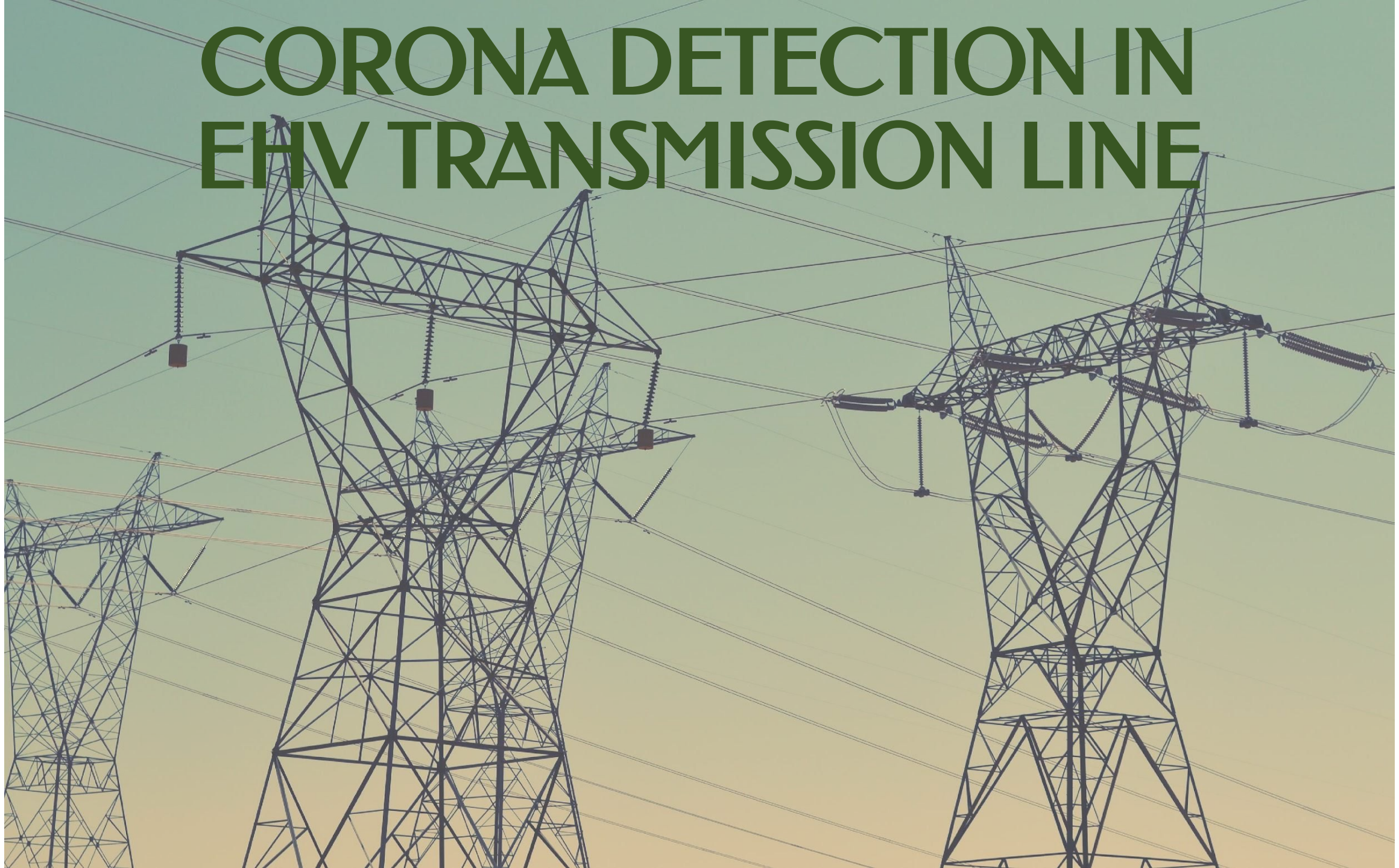
# CORONA DETECTION IN EHV TRANSMISSION LINE



# Objectives

1. To get acquainted with various Python libraries which help in digital image processing & computer vision.

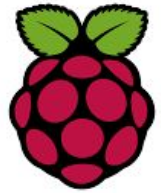
2. To learn python programming in order to process normal and UV image.

3. To detect non-visual and visual corona between insulator discs with the help of digital image processing & Deep Learning.

# Technologies

- Python
- Arena SDK
- LUCID VISION Atlas10 UV camera
- Embedded system
- Normal camera
- Windows 11
- Jupyter Notebook
- Google Colaboratory
- Raspberrypi 3 & 4


LUCID VISION LABS




# Proposed System

**Software** : Arena SDK – Win10, 32/64-bit (984 MB)  **Company** : LUCID VISION
**Support Interface** : Jupyter Lab
**Specification** :

Sensor Model : Sony IMX487 CMOS (Pregius-S, BSI)

Shutter Type : Global

Sensor Size : 11.1mm (Type 2/3″)

Resolution : 2840 x 2840 px, 8.1 MP

Pixel Size : 2.74 µm (H) x 2.74 µm (V)


USB camera


STEPS:

# 1. First Step

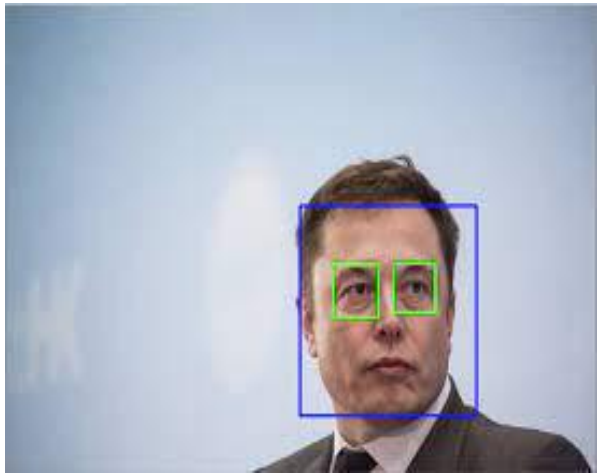
- Learning about the basics of image processing with the help of various python libraries like:
    - Numpy
    - Matplotlib
    - Opencv, etc

- Performed the following:

  i. Object Detection:

  1.*Face & Eye Detection*

  2.*Facial Expression & Emotion detection*



- ii. Image Segmentation:

  *Using the pretrained model and coco file with Opencv*

- iii.Image classification:

  *Using various Machine Learning Algorithm*

# 2. Second Step

- Took two images of one bottle one zoom in and the other zoom out.
- Both the images are captured from different positions with the same camera.
- Used translation, rotation, change of the brightness & contrast of two images as per need and developed a homography matrix in order to find the similarity of two images.
- Also used template matching and feature matching using SIFT and ORB to find the similar portions.
- Superimposed the two images according to the matched portions.


Zoomed in Image of Bottle


Zoomed out image of Bottle

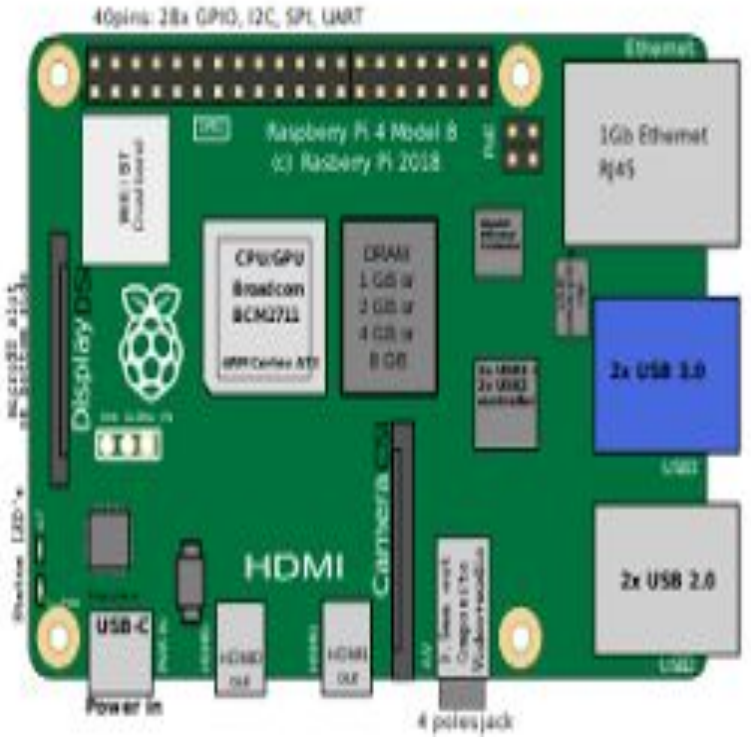

Superimposed image

# 3. Third Step

- Understanding the working and the operation of Raspberry Pi.
- Installation of softwares in Raspberry Pi.

- Executing python programs in Raspberry Pi.

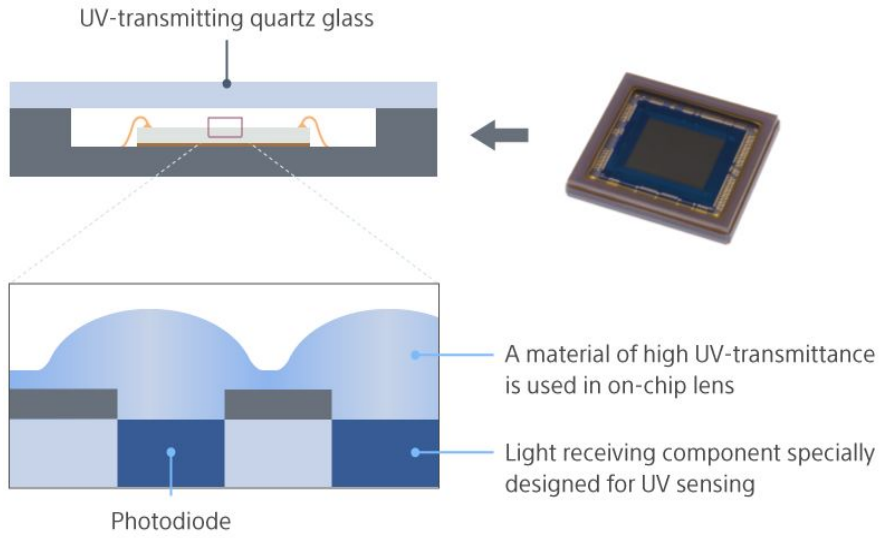
Tried to work with Raspberry Pi 3 & Raspberry Pi 4.



# 4. Fourth Step

## Understanding the working of Atlas 10 UV Camera:

- UV transmittance quartz glass for cover glass.
- UV transmissive material used for micro-lens.
- Specially designed photodiode for UV.
- Pregius S pixel structure for overall increased sensitivity
- We require a SMPS to maintain constant dc voltage in order to switch on the camera.
- We have to install Arena SDK software for operating the UV Camera.




- There is a ethernet port in this camera through which we can connect our laptop with the camera.It can help us to operate the camera with Arena SDK software.

# 5. Fifth Step

- We captured various images of an UV light source with the help of the UV camera.
- We tried Custom Object Detection to detect the area around the UV light source.
- We did the Custom Object Detection using YOLO V8.
- After Custom Object Detection, we tried to find the area of maximum light intensity in the detected area.


The red box detects the object and the green box detects the area with maximum intensity.