Low-Level Design (LLD)

1. Video Capture:

- **Class/Module:** VideoCapture
- **Functions:**
  - initialize_camera(source): Initializes video capture from the given source (camera or file).
  - read_frame(): Captures a frame from the video source.
  - release(): Releases the video capture resources.

2. YOLOv3 Object Detection:

- **Class/Module:** YOLOv3Detector
- **Functions:**
  - load_model(weights_path, config_path): Loads the YOLOv3 model using provided weights and configuration files.
  - detect_objects(frame): Performs object detection on the given frame.
- **Data Structures:**
  - boxes: List to store bounding box coordinates.
  - confidences: List to store confidence scores.
  - class_ids: List to store class IDs.
  - centroids: List to store centroids of detected objects.

3. Distance Calculation:

- **Class/Module:** Distance Calculator
- **Functions:**
  - calculate_distance(point1, point2): Calculates the Euclidean distance between two points.

4. Annotation:

- **Class/Module:** FrameAnnotator
- **Functions:**
  - draw_bounding_box(frame, box, color): Draws a bounding box on the frame with the specified color.
  - Check violation

5. Display:

- **Class/Module:** Frame Display
- **Functions:**
  - show_frame(window_name, frame): Displays the frame in a window.
  - wait_key(delay): Waits for a key press with a specified delay.
  - destroy_all_windows(): Destroys all OpenCV windows.