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Programming 3 Project Design Document:

Implementation Details:

Programming Language:

The code uses Python programming language and uses these libraries below:

Ultralytics YOLO: The Ultralytics YOLO library is used for real-time object detection. It provides pre-trained YOLO models that can be easily integrated into the application. The YOLOv8 model is instantiated in the ObjectTracker class.

OpenCV: OpenCV is employed for camera input and image processing. The Camera class initializes a video capture object using OpenCV, and frames are processed using OpenCV functions.

Data Description:

Input Data:

Video frames obtained from the camera using OpenCV.

Pre-trained YOLO model weights file (best.pt) used for object tracking.

Output Data:

Detected object bounding boxes and associated information.

Algorithms and Libraries:

Object Tracking Algorithm:

YOLO (You Only Look Once) is utilized for object detection and tracking. YOLO is known for its speed and accuracy in real-time object detection. The ObjectTracker class initializes the YOLO model with the specified model weights (best.pt) and utilizes it to track objects in each frame.

Image Processing:

OpenCV is employed for image processing tasks, such as reading frames from the camera, drawing bounding boxes around detected objects, and displaying the processed frames.

Hardware Acceleration:

The code assumes that the hardware supports GPU acceleration since YOLO models can benefit significantly from GPU processing.