Real-Time Scrap Classifier & Robotic Pick Simulation — Write-up

Problem understanding:
- Simulate a scrap-sorting vision pipeline with detection and pick-point generation.

Approach:
- Use YOLOv8 for object detection (3 classes: metal, plastic, paper).
- Create a synthetic dataset for quick demo, provide training wrapper and inference scripts.

Deliverables in this package:
- Code for training, inference, and a simple Streamlit dashboard.
- Small synthetic dataset to run immediate demos.

How to run:
- Install requirements from requirements.txt
- Optionally train using train_yolov8.py
- Run inference: python src/infer_realtime.py --source dataset/images/train

Edge deployment ideas:
- Convert to ONNX, then TensorRT; quantize model to int8; optimize image pipeline.

Challenges & Learnings:
- Real dataset variability, annotation quality, latency vs accuracy tradeoffs.