

Bibliography Report

Integration and Comparison of vision models for smart inspection cell

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1. Research Background

The growing demand for zero-defect manufacturing and Industry 4.0 integration has accelerated the adoption of AI-based visual inspection systems. Manual inspection processes are time-consuming, inconsistent, and error-prone. Advancements in deep learning and robotic simulation now enable smart inspection cells to achieve high accuracy, consistency, and scalability in industrial quality control.

2. Key Research References

1. Zhang, Y. et al. (2023). *Deep Learning for Visual Surface Defect Detection*. IEEE Access.
2. Liu, C. et al. (2022). *CNN-Based Automated Defect Detection in Automotive Parts*. Journal of Manufacturing Systems.
3. Ultralytics (2024). *YOLOv8 Documentation*. Retrieved from <https://docs.ultralytics.com>
4. SimPy Documentation (2024). *Discrete-Event Simulation for Python*.
5. RoboDK API Reference (2024). *Robotics Simulation and Offline Programming Framework*. Retrieved from <https://robodk.com/doc>
6. OpenCV (2024). *Computer Vision Library*. Retrieved from <https://opencv.org>
7. Albumentations (2023). *Data Augmentation for Deep Learning*.

3. Tools and Frameworks Referenced

- **Deep Learning:** YOLOv8, MobileNetV2 – Vision-based defect detection and classification.
- **Simulation:** RoboDK, SimPy – Conveyor and robotic pick-and-place simulation.
- **Dataset Tools:** Onshape, LabelImg, Albumentations – Data preparation, labeling, augmentation.
- **Visualization:** Matplotlib, Blender

4. Relevance to Current Work

This project builds upon prior research by integrating AI-based visual inspection with robotic simulation for real-time sorting. The comparative study between YOLOv8 and MobileNetV2 evaluates performance trade-offs for edge deployment on platforms such as NVIDIA Jetson Nano.

5. Expected Academic and Industrial Impact

- Provides a unified framework combining computer vision and robotics for defect detection.
- Offers a synthetic gear defect dataset for training AI models.
- Promotes reproducible, simulation-based inspection workflows for Industry 4.0 applications.

Citation:

Parnambedu, S. P. (2025). *Integration and Comparison of vision models for smart inspection cell* GitHub Repository. Retrieved from <https://github.com/Pallelayaswitha1/Integration-and-Comparison-of-vision-models-for-smart-inspection-cell>