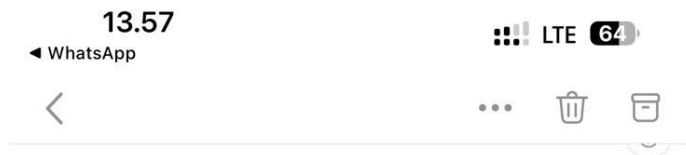


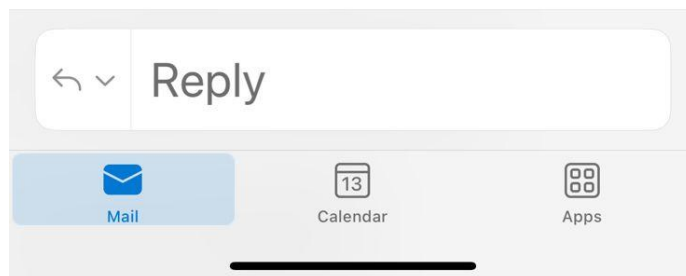
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PCB Defect Detector: Deep Learning to Detect Component Installation Errors in PCB Production

8th International Conference on Applied Engineering 2025 - Electronic

Errors in component installation on Printed Circuit Boards (PCB) can lead to de-vice functionality...

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Content Reviews

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A

Recommended Changes/Reviewer Comments

The article presents a relevant study on PCB defect detection that contributes to quality control in electronics manufacturing; however, it offers limited novelty since it relies on common image processing or machine learning approaches without introducing a new detection model or experimental valid algorithm structure, and evaluation metrics, while the discussion mainly restates results without deeper comparative analysis. References are adequate but should contain more than 10 references and include more international or recent works, and the English writing requires improvement for clarity a applicable but needs refinement in methodology description, literature depth, and language polishing to reach international publication standards.

B

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PCB Defect Detector: Deep Learning to Detect Component Installation Errors in PCB Production

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Available Online 29 December 2025.

DOI

10.2991/978-94-6463-982-7_36

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Keywords

PCB; YOLO; Defect Detector; Automatic inspection

Abstract

Errors in component placement on Printed Circuit Boards (PCBs) can lead to functional failures and increased production costs. Manual inspection for identifying and classifying such errors remains a significant challenge in the electronic manufacturing industry. Therefore, there is a need for an accurate and efficient automated inspection system. This study aims to develop an automated detection system for PCB component placement errors using the You Only Look Once (YOLO) algorithm. YOLO provides a one-stage detection process that eliminates the need for multi-step approaches such as region proposal methods. The development process involves dataset collection, defect labeling and annotation, data preprocessing, model training, and performance evaluation. The proposed model is developed to detect various types of defects, including missing components as well as misaligned or improperly mounted parts. The system's performance is analyzed using accuracy, precision, confusion matrix analysis, and inference speed. Experimental results demonstrate that the proposed YOLO-based system can automatically detect component placement errors with high accuracy, thereby improving inspection reliability and supporting faster and more efficient PCB production processes.

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